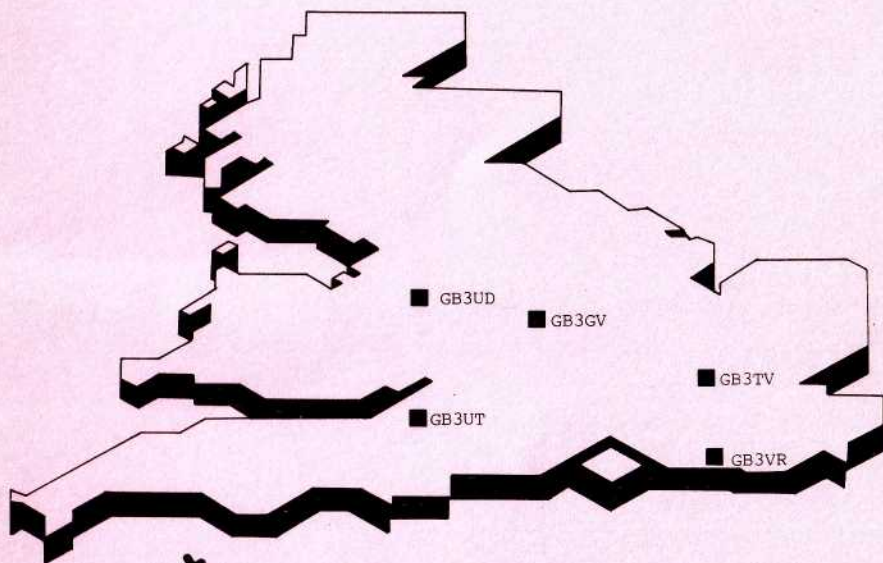


# CQ-TV

MAGAZINE  
No. 121

## BRITISH AMATEUR TELEVISION CLUB

FEBRUARY 1983



**latest**

### TV REPEATERS

ALSO.....

COLOUR CAPTION KEYS

A 1GHz OSCILLATOR

TV REPORTING CHART

A TV RECEIVER

Plus a host of other goodies.

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PLEASE NOTE: If, when writing to a committee member, a reply is required, please enclose a stamped addressed envelope or, in the case of an overseas member, an International Reply Coupon.

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## MEMBERSHIP

FULL YEAR: £4 or £1 for each remaining quarter of the year.  
All subscriptions fall due on the first of January each year. Overseas members are asked not to send foreign cheques please.

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CLOSE FOR PRESS DATE FOR THE MAY ISSUE.....20th March 1983

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# EDITORS POSTBAG

Dear Ed,

I wonder if the BATC has any recommended procedure for ATV operators, bearing in mind the ever-increasing activity on a band that can only accommodate one channel.

On numerous occasions some stations seem to insist on very long transmissions, far longer than is necessary to establish a one or two way contact. This makes the band unusable by other operators. Could I suggest a 'FIVE MINUTE RULE', after all, this is sufficient time for a reasonable operator to establish contact and even look round the shack, plus a camera shot of the operator.

Also, as an active ATV operator, I have become aware of the increasing number of Video Recorders in use, and one quite often sees material which seem as though they may be subject to copyright restrictions.

Any comments will be welcome to clarify these points.

R.M Webb, GBVBA

*Certainly Mr. Webb, you have made a valid point concerning some operating practices. The BATC committee are aware of the situation and in fact advice on how to conduct a QSO under various conditions will be included in a new booklet, aimed at newcomers, which is under preparation at this moment.*

*Your second point is one that will always occur where a visual medium is being employed. Happily it seems that there are only isolated cases. Such a practice of course is bad for amateur television and could lead to the culprits being prosecuted and having their licences revoked.*

*Editor.*

Dear Sir,

Greetings to you from Trinidad. Having got your name and address from a book at the library, I would be very thankful to know from you the full particulars about the British Amateur Television Club. and how I can become a member. Thanking you for your kind help in advance.

Rupert N. Barrow  
San Fernando,  
Trinidad.

*Welcome aboard Rupert. How about letting me know what you get up to out there?*

*Ed.*

Dear Ed,

Having just received my copy of CQ-TV120, I felt compelled to write in reply to the letter from Chris Maxwell, GBMKT concerning multi-pin video sockets.

First, the Sony 'Q' type 14-pin plugs are NOT the same as 'K' type. The 'Q' type are all-metal, bayonet locking EIAJ types as used on Sony professional gear. 'K' type are push-fit black plastic ones used on Betamax recorders and domestic cameras, (CQ-TV120 p38). They are much cheaper! The 2 10-pin EIAJ plugs shown are bad drawings of the same thing, (see p37).

You may be interested to hear about some of the activity in the Poole and Bournemouth areas. I (Tony, G6JAT) work at the local college and so have access to a lot of very useful colour gear from time to time. Mark, G6JIX and I are especially interested in the video side of things, and our long-term project is to kit out Marks transit as an O.B. unit. Personally I am not very active on the air, partly because I live in an appalling location. However, there are numerous, very active ATVers including



Nick, G8MCQ, Jim, G4MHF and Bill, G2HCG as well as many others interested in the area. Most activity has been on 70cm, although there have been some experiments on 24cm and 3cm. Jim, in particular, is also engaged in SSTV.

Several demonstrations have been given, including some at the recently - formed "Flight Refuelling Ltd. Amateur Radio Society". Two events of particular interest over the summer were; the two-way 70cm vision link between Brownsea Island and Constitution Hill, set up to coincide with the Scouts 75th anniversary camp on the Island - no claims for DX. It was great fun for all concerned. Colin, G6MXL did trojan work as cameraman on the mainland with me transmitting from our O.B. vehicle (my mini!). Our pictures were also received (in colour) by a holidaymaker, who recognised our location from the shots and drove up to find out what was going on! The second interesting event was staged for the Flight Refuelling RMA open day. A special event station, GB2RMA was set up and we organised a roving colour camera with back-pack transmitter to relay sports events etc. back to the base station. G6JIX and G6MXL manned the camera with me, using a 12v 70cm transmitter kindly loaned by Mervyn, G4BGT and Judith (G?), with G8MCQ and company on the receiving end. The Mayor and Mayoress of Poole, who were the special guests of the afternoon, expressed considerable interest.

I must leave it to others to give you more complete details of all the other amateurs who are active in this area, but I hope the foregoing has been of some interest.

Thanks for a great Club and a super mag.

Tony Marsden, G6JAT.

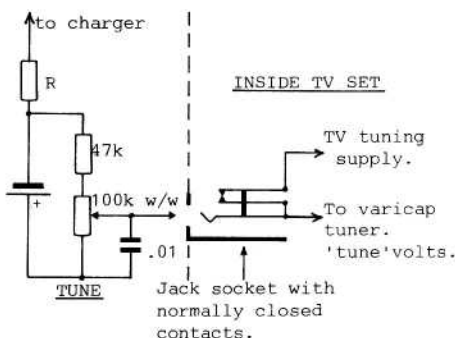
*Thanks for all that Tony, maybe others would also like to write in similar vein.*

Dear Ed,

The ELC1043/05 TV tuner can be modified to ATV by feeding the varactors with 350-400mV of FORWARD bias. This roughly maintains tracking and makes a good ATV tuner. Also, with suitable switching, the set can be returned to domestic operation. I use a jack socket on the rear of the set with an internal supply (a Nicad!) The frequency is set by a pot. and a resistor. The resistor limits the maximum voltage to the varactors. As is usually the case when using modified domestic tuners, a good pre-amplifier is very desirable and makes all the difference.

The usual safety precautions should be taken if the TV chassis is live.

Peter Saul, G8EUX.



## NEWS ROUNDUP

### CQ-TV COMPUTER MAILING

The mailing process for sending this issue will be conducted using the new club computer. Please check the details on your address label and, if incorrect, please print out clearly the correct details and send them to; Mr. D. Lawton. "Grenehurst", Pinewood Road, High Wycombe, HP12 4DD.

## COMPONENTS

If you're wondering where to get hold of silver plated copper wire for transmitters - or indeed ordinary enamelled copper wire in metric (or rather, sub-millimetric) sizes, you need look no further than *The Scientific Wire Company, PO Box 30, London E4*. They supply a comprehensive range of all types of wire and will send you a list on receipt of a stamped, addressed envelope. Service is prompt and they don't object to small orders provided you send cash with order.

Dave Powis of *Jewell and Powis* has a word for the wise and points out that not all grey plastic trimmers are PTFE ones, and only PTFE examples are useful at 24cm. Good brands are DAU and Mullard. Note that these trimmers are designated for only a few twiddles; after that they lose their stability.

The 2513 Character Generator i.c. seems to be catching out a few people. The General Instrument R0-3-2513 is the 5 volt version and requires just +5v and ground; the Signetics version needs -12v and -5v in addition and is best avoided. Suffix U or CGR-001 are the upper-case variety and L or CGR-005 are lower case. Other suffixes denote non-standard fonts, so avoid these. The ASCII codes for lower case characters differ from the u/c codes, so if you plug a L/c chip in where a U/c one was fitted you will get 'funny' results and it doesn't mean the chip is faulty!

Back to microwave trimmers. Waycom Ltd have introduced a new range of trimmer capacitors for use at UHF and microwave frequencies. The trimmers have minimum Q values of between 1000 and 5000 at 250 MHz. Self-resonant frequencies lie between 5 and 13 GHz. The MTRX2X series includes values of 0.3-1.2pF, 0.4-2.5pF, 0.6-4.5pF, and 0.8-8pF.

Waycom Ltd., Wokingham Road, Bracknell, Berkshire RG12 1ND.

## PLUGS AND SOCKETS

Or slugs in pockets. Andy G8PTH advises anxious readers that the 10 pin VHS (J-type) diagrams ARE the same, merely just different drafts-mens impressions of the same thing. The Sony connectors mentioned by Jessops are NOT the same as K-type: Q-types are used on professional gear and will not mate with the K-types used on Beta home video equipment. However, k-type plugs and sockets (as well as J,Q and Honda types) are now available at very moderate prices from *Comprehensive Video, 565 Kingston Road, London SW20 8BR*. If you write to them mentioning this magazine, they will send you a superb catalogue of all sorts of hard-to-find video spares.

## ET - ATV?

"It's hard enough to find intelligent life here in Washington" noted Senator William Proxmire as he led the fight to eliminate NASAs search for Extra Terrestrial Life programme. CQ magazine (USA) concludes that it is up to amateurs to take the lead in this field of activity, who will be supported by Californian astronomer Robert Bracewell. Bracewell, quoted in *Science 81*, is optimistic that aliens may have the resources to detect stray radio and television signals from Earth. For example, TV shows transmitted in 1950 have already travelled 175 trillion miles into space, far enough, perhaps, for detection by aliens. For ATVers the implication is clear; brush up your operating procedures and print a few extra QSL cards!

## CQ-TV119 FM-TV DEMODULATOR

G3VZV reports that the FM-TV demodulator in CQ-TV119 works very well indeed. Graham does however mention that a couple of circuit changes need to be made in order that the output transistors do not run too hot: The collector resistor on the 2N5179 should be increased to 1.5k. and on both BC547Bs add 100R resistors and 0.1 decoupling capacitors to the collector supplies.

Graham further reports that during comparison tests with G4CPE, his signals on 24cm using the demodulator were grade 5 (including inter-carrier sound) whilst slope detecting the same transmission produced a grade 3 (just) picture.

(Do remember that it will probably be necessary to provide a reasonable amount of IF amplification before such a demodulator. This ensures that the IC is driven into hard limiting. Try the OM series of hybrid wide-band amplifiers. ed.).

#### N.B.T.V.A. SPECIAL OFFER

If you are NOT ALREADY a member of the Narrow Bandwidth Television Association and would like to join at a reduced subscription, just send the envelope in which THIS copy of CQ-TV arrived (all of it!) to the Hon. Treasurer, S. Kujawinski, 54 Park Drive, Hucknall, Nottingham NG15 7LU. Enclose a crossed cheque or P.O. made payable to "NBTVA", value £1.50p. This will save you .50p as a paid-up BATC member. Subscription covers four quarterly newsletters, club services and an annual convention in Nottingham.

#### WORLD-WIDE FAST-SCAN ATV SATELLITE

This is not a wind-up, it's the idea of crusading ATVer Henry Ruh, KB9FO, who used to run "A5 Magazine". He suggests that ATV enthusiasts design, build and orbit a satellite of their own, specifically to enhance ATV operation. His proposal is for a bird carrying a 2MHz wide transponder capable of relaying "fair quality" monochrome or reduced bandwidth "colour under" pictures, operating either in the 1240MHz or 3.5GHz C-band "downlink" region. Given the current improvements in microwave devices and the success of moonbounce SSB contacts already enjoyed on the 1.3 and 2.3GHz bands, this could be a feasible project one day. "A5 Magazine" has endorsed the project and has pledged an initial \$500 to get the project off the ground. A5 Editor Mike Stone has also written to Ray Kassis, President of the USA Cablesat General Corporation

to ask that ATV be included in the well publicised Cablesat amateur transponder proposal. Further reports will be published in "A5" magazine (and CQ-TV) and any correspondence should be directed to A5 ATV Magazine, PO box H, Lowden, Iowa, USA. A sample copy of A5 may be obtained by sending £1 to the UK agent; A Emmerson, GBPTH. 4 Mount Pleasant, Blean Common, Canterbury, Kent. CT2 9EU.

#### CQ-TV COPY

For the last few issues I have been fortunate in that I have been able to assemble enough material to produce a good sized magazine. My thanks to all those who have contributed, however, the file is getting very thin and if the magazine is to be kept at its present page count I must have more copy. Would members please search their minds (and files) for any contributions however small or insignificant. If anyone needs guidance on how to write or present their copy I would be glad to help either by letter or by phone.

Editor.

#### ATV RESEARCH MATERIAL

I would like to thank all those members who so kindly sent old issues of CQ-TV magazine together with other historic material, for their trouble. I now have all the required copies of the magazine but would still welcome any other material that you may be able to turn up.

Editor.

#### SUBSCRIPTIONS-LAST CHANCE!

ALL subscriptions for 1983 should have been paid before the 1st of January. Members who have not yet renewed are reminded that unless they do so before the 1st of April, they will be deleted from the computers' current list and will therefore receive no further copies of CQ-TV magazine.

## LWT EQUIPMENT

Another quantity of ex-broadcast TV equipment has been very kindly donated to the Club by London Weekend Television. We should like to thank LWT and our President Mr. Roger Appleton (Director of Engineering) for making the equipment available.

All the gear has been sold to members who sent in requests for information on such donations. Should you wish to be advised when such equipment is available, please send a SAE to the BATC Equipment Registry marking the top left-hand corner 'Equipment Donation'. It should be remembered that you may not hear for some time since donations are of course of a sporadic nature.

Prices charged to members are nominal and all proceeds go to Club funds.

Equipment Registry.  
"Somerby View",  
Bigby,  
Barnetby,  
LINCS.

## COMPUTER USERS

"Beebug", the BBC microcomputer users group newsletter publish a list of radio amateurs who use the computer in their hobby. Perhaps this idea could be usefully poached for our magazine.

If you own a computer (particularly if you use it as part of the ATV station) and would like to contact others of a similar bent, please send brief details (including make of computer) to the Editor. How about some TV related computing articles as well?

## SINGLE CHIP TV!

Thorn have introduced two new portable television sets to their black and white range. The sets are designated 38020 (black cabinet) and 38030 (white cabinet). The suggested selling price for these models is £49.95p. The reason Thorn have managed to keep the price down is that they have again designed a radically new chassis, (remember the TX-9?). The chassis uses a single i.c. (Motorola MC13002) which incorporates the IF system, video processing, a.g.c, sync. circuits plus the line and field generators. The only other items therefore required are a tuner, an i.f. filter, a video output stage, the audio system and a PSU. The February issue of "Television" magazine will carry further details. Looks like a good bet for portable stations.

## MEMBERSHIP FORMS

Since this is the first quarter of our year, it seems a good opportunity to include in this issue a membership application form for use by anyone wishing to join the Club. The form may be found on the pullout section and may be photo-copied for use if the form is required for ordering publications. Forms are available by sending a SAE to the membership Secretary or, if a quantity is required for a rally etc. Please contact the Chairman, Mike Crampton, at 16 Percival Road, Rugby, Warks. Tel: 0788 73276. The membership Secretaries address is on the inside front cover.

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## LATE NEWS

THE BATC IS TO HOLD ITS 1983 EXHIBITION/SHOW ON THE 22nd OF MAY AT THE POST HOUSE HOTEL, LEICESTER. FULL DETAILS WILL BE INCLUDED IN THE NEXT CQ-TV. Further information from the Hon. Sec. Trevor Brown.

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# COMPOSITE COLOUR ON THE **BBC** MICRO.

Those of you with a BBC microcomputer may have been a little surprised that the composite video output does not include the colour burst signal, thus the output from the BNC socket is in black and white. This omission is easily rectified by connecting the burst signal from the emitter of Q9 to the base of Q7 via a 56pF capacitor. It is possible to accomplish this modification on the component side of the printed circuit board as shown in the illustration.

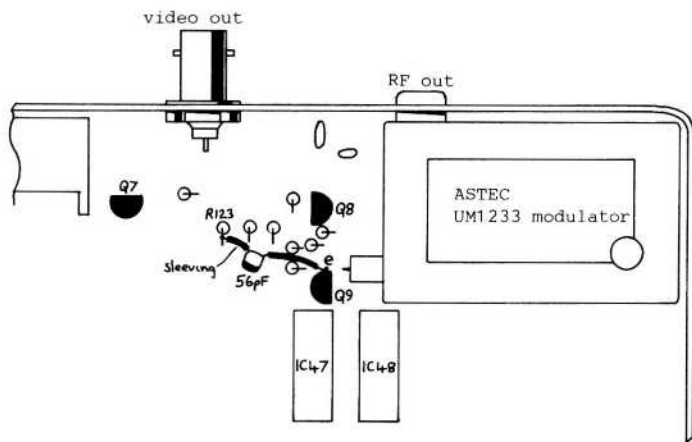
The capacitor should have its leads protected with lengths of sleeving to prevent any short circuits. One leg should be soldered (carefully) to the emitter of Q9 whilst the other should be connected to the top of the 470 Ohm resistor, R123 which stands up off the board in the position shown.

If anyone requires access to an inverted video signal, this is available at S26 near the video ULA.

Remember that any un-authorised modification may invalidate the manufacturers guarantee.

Incidentally, did you know that of all the popular computers available, the BBC is one of the only ones to have true 2:1 interlaced video outputs? This makes the computer well suited to amateur television applications including recording and vision mixing. With the superb range of colour graphics available (as was well demonstrated at the last BATC Convention) the machine should find a ready home in the TV shack.....There's a new one in mine!

Editor.



INSIDE THE BBC COMPUTER SHOWING THE POSITION OF THE NEW CAPACITOR

# A COLOUR CAPTION KEYS

by John Goode.

This circuit was designed at the instigation of the Editor of this magazine, in order to provide a means of combining both colour and monochrome video sources without the complexity and expense of building a full colour vision mixer. It was suggested that it may be desirable to combine certain sources at the RGB stage, thus making the construction of only one PAL coder necessary.

In particular, the sources suggested were:-

- (1) The colour test card (RGB output).
- (2) The "Pretty Colour Generator" (RGB output).
- (3) Character generator (mono' output)
- (4) Digital clock (mono' output).

It was therefore decided to design a caption-keying unit, similar to a well-tried monochrome design I had built some years ago, and "triple it" for RGB colour. This offered the (incidental) advantage that in injecting the monochrome sources to the R, G and B chains it would be relatively simple to colourise them by simply varying the amount of signal fed to each chain.

The block diagram of the unit is shown in fig.1. As can be seen, the four sources are divided into two groups - the test card and the P.C. generator, (both RGB), forming the "main" signals; into these can be keyed the outputs of the character generator, or the clock, or both. As implied above, the character generator and clock signals may be colourised using the R.G.B. gain controls. The output of the unit is suitable for driving the (blue) Handbook PAL coder. No external SPG pulses are required, although all sources must be synchronous.

## THE CIRCUIT

The circuit is shown in fig.2. The part above the dotted line should be repeated for the Red and Blue channels, only the Green channel being illustrated. The input switching shown is mechanical for simplicity, as it is not assumed that "on-air" (vertical-interval) switching is required.

It is suggested that four-pole mutual-release mechanically interlocked pushbuttons are used for the two RGB inputs; simpler switches can be used for the keying sources, but it should be possible to select individually, both together, or neither.

The input circuits use a simple common-base arrangement, with the signals summed at the emitters. The outputs are buffered by emitter-followers. The RGB chains are then DC restored before being applied to one side of a video-switching diode bridge, the operation of which was described in CQ-TV 112, (page 16).

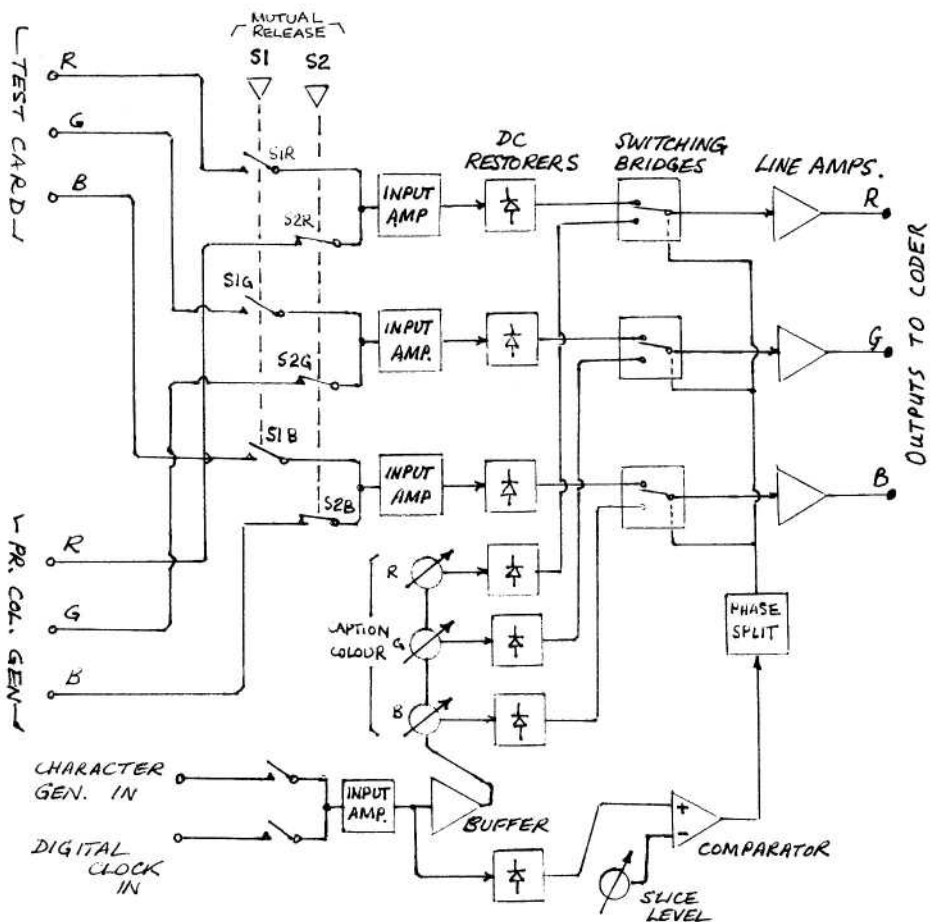
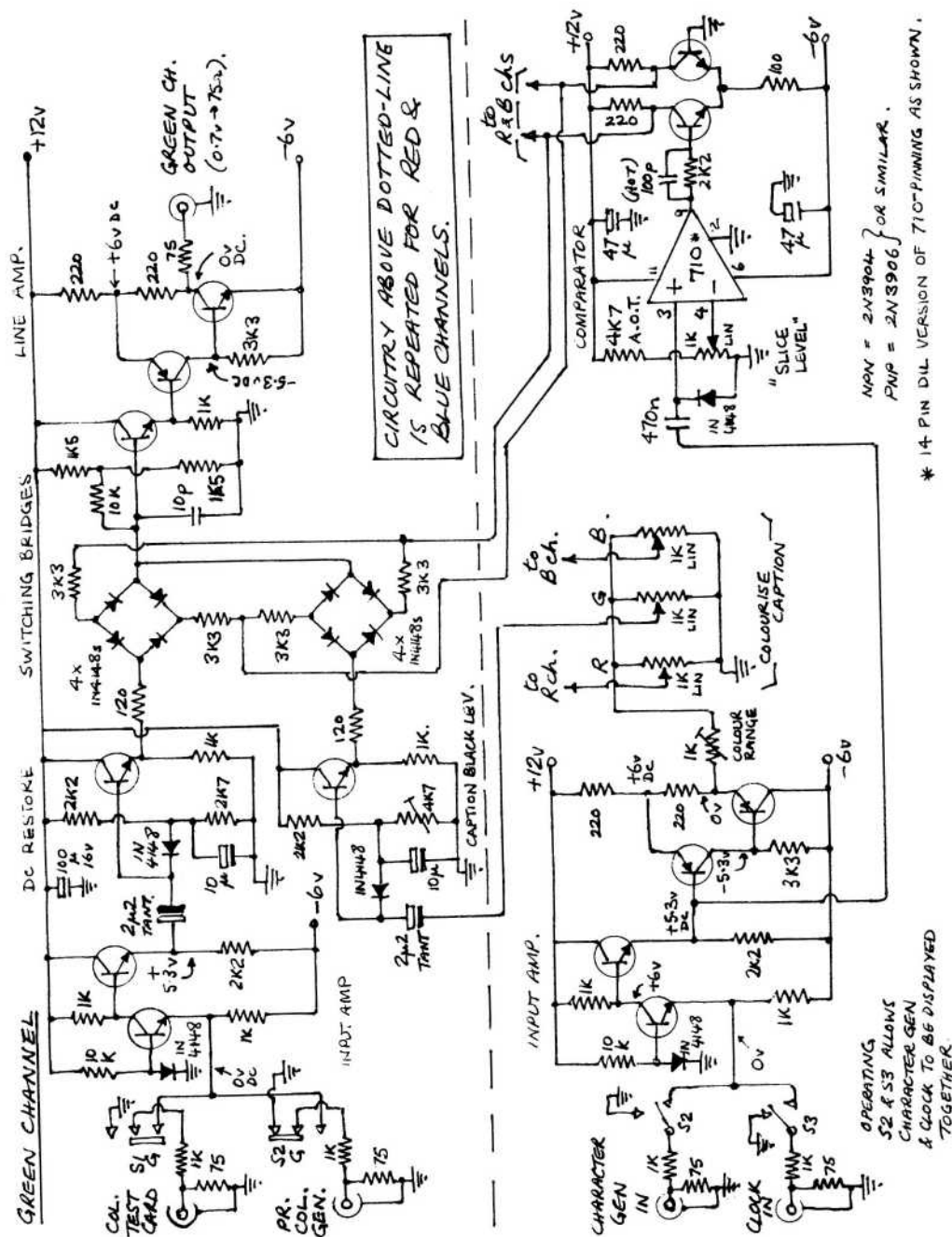


Fig.1.

BLOCK DIAGRAM.

Returning to the keying chain, after the input summing stage the signal path is split, feeding the 710 ic that operates the video switch (see CQ-TV 112), and the colourising potentiometers. The preset feeding the RGB controls is used to set the maximum level when a white caption is keyed (RGB controls to maximum). From the RGB controls the signals are DC restored prior to application to the switching bridges. The "caption black-level" preset control should be set to equalise the black level with that of the main video. From the video switch the signals are passed through line-feeding amplifiers giving outputs of 0.7v into 75 Ohms. (RGB outputs are non-composite, of course).



## EDITORS NOTES

The original design incorporated electronic switching between the main video sources. In practice it was found that since a digitally generated signal (test card) was being used as one source, the high frequencies present caused a certain amount of crosstalk when the second source was selected. The fitting of three bandpass filters, such as the one described in CQ-TV 120, should cure the problem, however, since the unit is intended purely as a caption keyer and colouriser, and would be used in front of any vision mixing desk, so obviating the need for vertical interval switching, I decided that simple mechanical switching of the main vision sources would be sufficient in this application. Such switching provides good isolation and somewhat simplifies the circuitry.

No problems were experienced in the construction and testing of the unit. I made a printed circuit board for the prototype (hand done!) but it could easily have been built on Veroboard.

## SETTING-UP

Monitor the R,G and B outputs in turn using an oscilloscope. Apply both a linear "main" picture and a keying signal (caption). Adjust the "caption black-level" control until the black levels of the two pictures are identical.

Monitor the composite colour output from the coder and ensure that there is some white content on the "main" picture. Turn all three colour controls fully clockwise (producing white letters), and adjust the range control so that the tips of the character waveform correspond to the peak white of the main picture. Turning the three colour controls fully anti-clockwise will turn the caption black. The "slice level" control may be front panel mounted and, if necessary, the range adjusted by the 'AOT' resistor.

My character source at present is the (blue) BATC Handbook character generator. To use this up-end the 10uF capacitor at Tr6 and feed mixed syncs to the negative end of the capacitor. Connect the output (Tr6 collector) via a 75 Ohm resistor to the character generator input of the caption keyer.

The resulting display is far superior to the handbook generator in that the captions are inserted into a 'hole' cut into the main picture. The characters therefore appear sharp and dense. You have to use the colourising controls to appreciate the beautiful hues that can be obtained.

I should like to thank John Goode for his original design which, as always, was faultless.

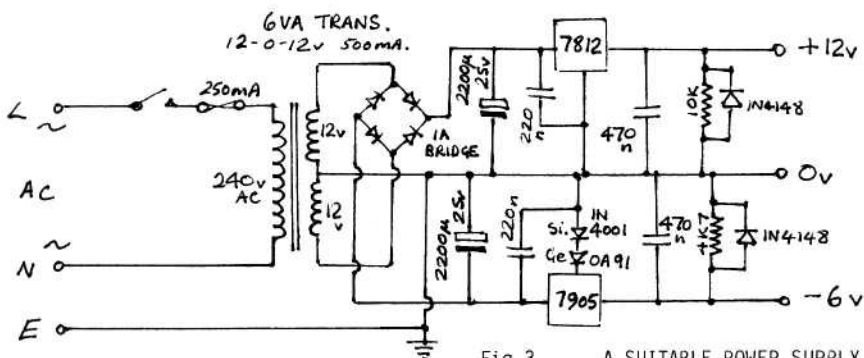


Fig.3. A SUITABLE POWER SUPPLY.



# TV ON THE AIR

Our featured letter this time (it was the only one, shame on the rest of you!) comes from Rod Timms, G0VBC, who resides in Woodville, near Burton (where the beer comes from). His story concerns the tests he has been carrying out on 24cm with our editor, John G3YQC in Rugby: the facts speak for themselves and will make interesting reading for anyone thinking about "emigrating" to 24cm. So over to you, Rod.

John radiates 35W of FM and I radiate 35W AM, so we've been able to make some interesting comparisons between these two modes - it became apparent quite early on that FM is (i) easier to generate, (ii) easier to control and (iii) as easy to build as AM. Having said that I do recommend the challenge of high power 24cm AM: it takes quite a time to get the outgoing waveform up to scratch but it is most satisfying when good results are obtained. In contrast, John using FM has no such difficulties, he knows what ever video source he chooses to use, it will be faithfully reproduced at the receiving end.

Talking of receivers, I've updated mine with a MM preamp. We have certainly found this low noise preamp to be very good value. Mine is fitted at masthead and the reception of John's signal improved by at least one vision point. I use the Jaybeam 15 over 15 for receive and the Tonna 23 element (1260 MHz) for transmit. Slope detecting John's FM signal results in about P3 but by using a FM receiver (Rigonda TV modified with NE 564 PLL demodulator) his picture improves to a P4½ - yes, as much as that! *(So how about letting us have the circuit details, Rod?)* As can be seen by the attached RX diagram filtering is the name of the game: without this amount of filtering commercial TV breakthrough is a severe problem at this location (Sutton Coldfield 1 megawatt on 600 MHz, line of sight). The MM preamp has a certain amount of filtering incorporated so in many cases extra filtering will not be so important.

Finally the band itself: I've certainly found on more than five occasions that a trough of high pressure prevalent a few hours before a deep low pressure moves in from the west provides far improved reception on 24cm over the path. It could be a coincidence but it's worth a mention. I can usually give John a P5 at these times. John can give me a P4 and then the next day, when the low has moved across the country, the band drops off. It's hard to say what constitutes flat conditions on 24cm but an average report for John's transmission is about a P4½ and he gives me about P3½ (the difference being due to my using a mast head amp. We have tried to exchange TV on most evenings. John and I are hoping to try out some helical aerials soon - will let you know results. G3XXKX is nearly ready to transmit on 24cm FM.

That's great, Rod, a most interesting report. The only other news we have this time is collected from here and there. To judge by the Benelux DX Club's newsletter (always a good read for the TV enthusiast) there were some good tropospheric openings this autumn. Pictured in the November 1982 issue are off-screen photos of G4ARD/P (11th September) and G8MNY (3rd September); both were taken by Ryn Muntjewerff in the Beemster, Netherlands. Logged in Rotterdam on the night of the 11th/12th September were G3WOR (Worthing) and G8RZO (Sheppey). Apart from that, Ian Roberts ZS6BTE from Glenstantia in South Africa indicates that he and ZS6KM have been licenced to run ATV on 70cm: these are believed to be the first such permits. He is considering the Fortop transmitter. Watch out for the new(ish) magazine, Ham Radio Today,

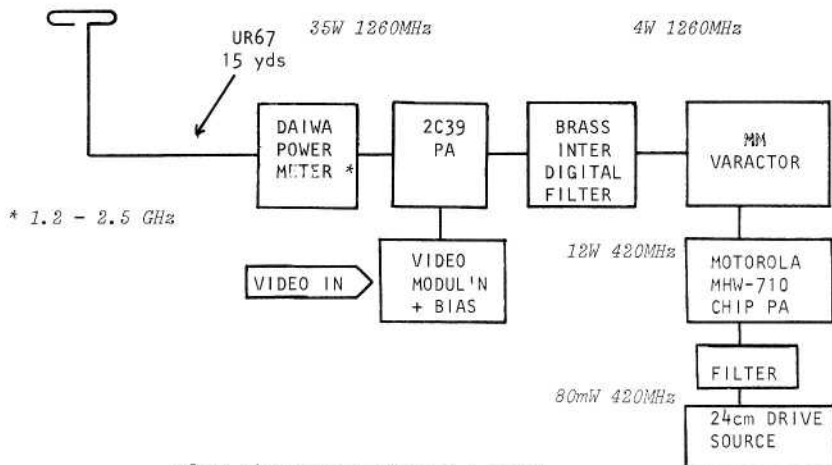
edited by Frank Ogden, G4JST. Frank is a great supporter of ATV and has commissioned a series on constructing a TV station by BATC committee member Trevor Brown, G8CJS.

That's it for this time. I'm looking forward to receiving all your letters for the next appearance of this column. Address them to me at 4 Mount Pleasant, Blean Common, Canterbury, Kent, CT2 9EU.

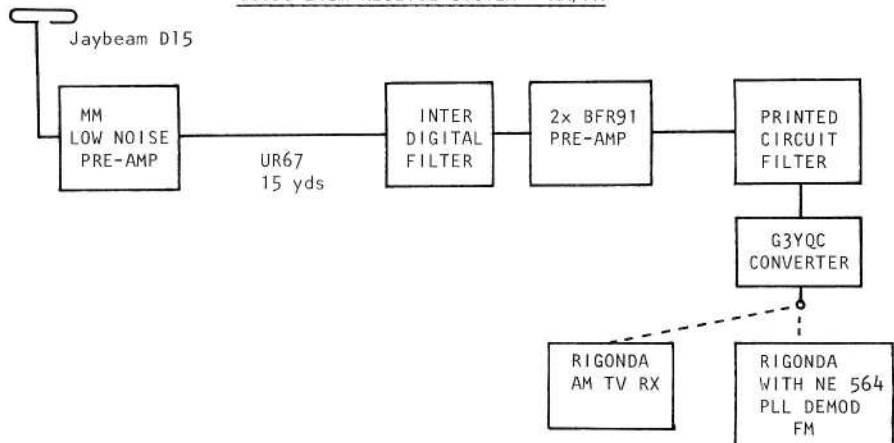
Andy Emmerson G8PTH

### G8VBC 24cm TRANSMIT SYSTEM - AM

Tonna 23 element (1260 MHz)



### G8VBC 24cm RECEIVE SYSTEM - AM/FM



# A 1GHz OSCILLATOR

by Gerard Wilson, WA6RDA.

This project is both simple and useful and can be built in one evening. I have built several of these using different lengths for L1 to change the frequency range. The dimensions described here will enable the oscillator to tune from about 950 to 1250MHz, and provide a full 10mW into 50 Ohms.

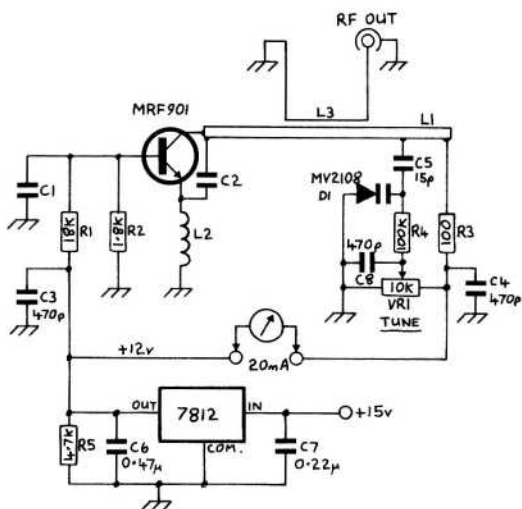
This unit may be used as a local oscillator for use with a double balanced mixer for a 24cm receive converter. Most low-drive mixers require plus 7dBm of local oscillator injection to provide optimum mixing, this unit provides this level plus a few dB extra.

## CONSTRUCTION

Figs 2 and 3 show the printed circuit pattern (actual size) and the layout diagram. Prototype boards were made using 0.062" double sided epoxy glass PC material (good quality) the track being cut out by hand using a handymans knife. Fig.4 illustrates the fabrication of capacitor C2. One of the emitter leads is folded back over the top of the transistor and is soldered to a small piece of copper or brass shim foil. Cut out a small piece of 0.031" PCB measuring 3/16" x 1/4", glue this directly on top of the collector lead which has been soldered to the end of L1, solder the shim foil to the top of this pad. This will provide the necessary feedback to sustain oscillation. Whilst not normally a critical component, it may be necessary to lengthen C2s pad if the oscillator fails to start reliably. C5 should be soldered with the shortest possible leads and should be folded away from L3 as shown in Fig.3 since it will have an effect on L3. L3 is made from a strip of 0.010" shimstock 3/16" wide (refer to Figs 3 and 5) and soldered to a coaxial output socket fixed to the earth plane side of the PC board. The output socket should preferably be SMA or SMB, but the square flanged BNC socket could probably be used, with care. The other end of L3 is soldered to ground as shown. L3 should be very close to L1 but be careful that it does not touch!

The PC board should be fitted into a custom-made tin box or one made from PC board material. The earth tracks on the component side AND the ground plane on the reverse should be soldered all round to the inside of the box. If the board is to be used in any other way 'thru wires' should be soldered through holes indicated by the spots on Figs 2 and 3. Also, copper or brass shim foil should be folded over the board edges, as indicated in Fig.3, and soldered to both sides. These precautions ensure a good earth connection at all critical points.

All the other components should be mounted as shown and all leads should be kept to a minimum. The PC board must be drilled to allow the MRF901 to fit flush with the PC tracks.



- C1. printed capacitor.  
C2. see text.  
L1. printed inductor.  
L2. 4t 22swg on 1/8" former, self supp. spaced one wire width.  
L3. .010" brass or copper strip bent as shown in text. Strip 3/16" wide.

Fig.1

1GHz OSCILLATOR CIRCUIT DIAGRAM

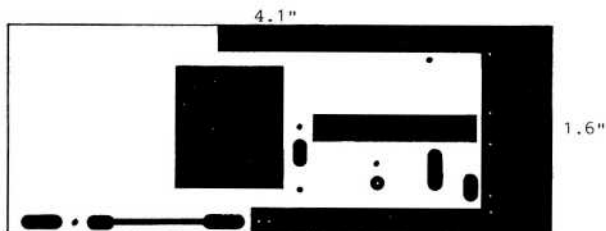


Fig.2

PRINTED CIRCUIT PATTERN (component side)

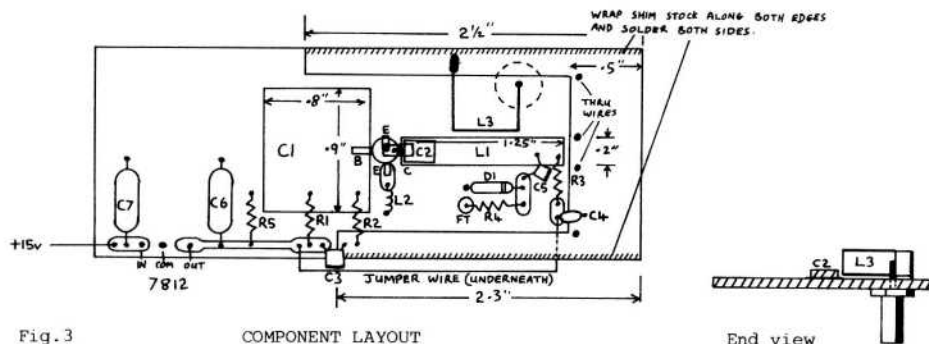


Fig.3

COMPONENT LAYOUT

End view

Although the on-board voltage regulator used in the prototypes is a 7812 1A device, the smaller 78L12 could probably be substituted.

R4 Connects to a feedthrough capacitor (C8, 470pF) or to a feedthrough insulator, in which case C8 should be soldered between the centre conductor and ground on the underside of the board. VR1 may be remotely mounted to a front panel although its connecting leads should be kept as short as possible.

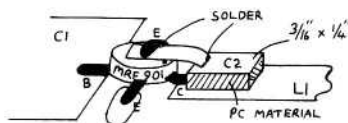


Fig.4 DETAIL OF C2

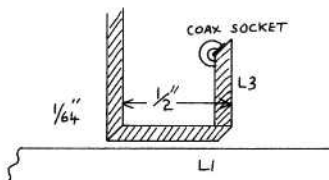


Fig.5 DETAIL OF L3

## VARIATIONS

If a fixed-tuned oscillator is required then D1, C8, R4 and VR1 may be omitted, in this case C5 should be selected to give the required frequency, and connected between L1 and ground. Fine tuning may be achieved by sliding C5 along the stripline L1. Moving closer to R3 lowers the frequency and towards the transistor raises it. Do not tap further than about half way down the line, instead, select a lower value capacitor for C5. Alternatively a small, good quality, 2-10pF trimmer capacitor may be used instead.

If the oscillator is tuned to the 24cm band, it should be possible to frequency modulate it with a video signal. C8 should be reduced to about 100pF and VR1 omitted, modulation can then be fed directly to R4, whose value may need reducing. This method has not been tried but is worthy of experimentation.

## TESTING AND PERFORMANCE

Up-end R3 and insert an Ohm meter, the current measured should be around 20mA and should not exceed 30mA. Check for correct oscillation and adjust the frequency as detailed above.

On the prototypes the unit was frozen to a frosty white and a shift of only 1.5MHz low was observed. The unit was then heated up with a heat gun to beyond touch, and it shifted only 2MHz above nominal which makes it a super choice for both indoor and outdoor installations.

This article has been prepared from the original which appeared in A5 Amateur Television Magazine and acknowledges with thanks the help of the Editor and the Author.



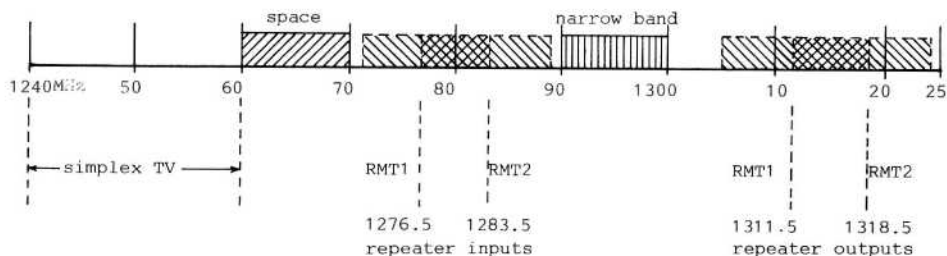
# TV REPEATERS

THE TIME DRAWS NEAR. FIVE APPLICATIONS FOR LICENCES TO OPERATE BRITAIN'S FIRST AMATEUR TV REPEATER CHAIN ARE WITH THE HOME OFFICE. AFTER MORE THAN TWO YEARS OF PLANNING AND ORGANISING, THE BATC NOW HOLDS ITS BREATH WHILST AWAITING THOSE ALL-IMPORTANT LICENCES WHICH COULD MEAN SO MUCH TO AMATEUR TELEVISION IN THIS COUNTRY.

The discussions are over, the arguments are resolved, the plans have been finalised, Graham Shirville (G3VZV) - our man at the hub - lets out a sigh of relief. Those five repeater proposals have been completed and have been passed to the Home Office by the RSGB for consideration.

This was the state of play as this piece was written (late December). Perhaps when you read this magazine, the licences will have already been issued. If so, I'm sure word will soon get round. It should also be announced on the IBA's ORACLE service.

As discussions have progressed, there have been some small alterations to the 1.3GHz band plan, and the frequencies allocated to the ATV service. Shown here is the latest PROPOSED bandplan put forward by the BATC and the RSGB. The plan at present has not been officially sanctioned by the Home Office, but is expected to be approved in the near future.



PROVISIONAL 1.3GHz BANDPLAN INCORPORATING ATV REPEATER AND SIMPLEX FREQ'S

The five repeaters which constitute phase one of the TV repeater programme are given in the following table together with their proposed channel numbers:-

GB3UT	Bath	YL49E	RMT1
GB3GV	Leicester	ZM25F	RMT1
GB3TV	Luton	ZL08D	RMT2
GB3VR	Worthing	ZK18B	RMT2
GB3UD	Stoke	ZN79B	RMT2

Stations using RMT1 channel will radiate an AM television signal at first, whilst those on RMT2 will radiate FM.

At this point it was intended to give a brief account of the progress being made with the phase one repeater projects. A letter was sent to each group but, at the time of writing (New Years Eve), only one reply has been received and that was from Roy Humphreys G6AIW, of the Worthing & District Video Repeater Group. Thanks Roy, at least someone is interested enough to reply. Perhaps the other groups would like to let us know how they are getting on by writing in time for the next issue. After all, this is probably the most important development in amateur TV for many years and a lot of people are VERY interested.

#### GB3VR

Extensive tests in the 24cm band have been carried out. Tests with an AM system proved disappointing, however, when FM was tried, excellent results were obtained. The Worthing group have therefore applied for an FM mode repeater licence.

The Aerial system will consist of two pairs of aerials. One favouring the East and the other the West. (The South Downs excludes coverage to the North). Each aerial will consist of six half-waves fed in phase and should exhibit around 12dB of gain.

The repeater will initially be located at the QTH of G8XEU on a site slightly to the North of Worthing.

Band pass filters have been made from the design in CQ-TV120. The 6502 control logic has been built and programmed by G8DHE. The receiver comprises a modified M/M converter into a standard TV IF amplifier strip. The FM demodulator and audio/video output together with an IF amplifier, are all in one unit. The transmitter - designed and built by G8KOE - uses a crystal locked, free-running oscillator multiplied to 24cm. A power amplifier is under way under the guidance of G8XRX.

The repeater will be carrier accessed on receipt of a valid video signal at the receiver which must be complete with correct sync. pulses.

Apart from the stations mentioned, G4JEI is also part of the team.

#### GB3UT

Little is known about this project although a newsletter (rather controversial) was given to the Editor at the last convention. This contained details of the groups thinking and experiments regarding the proposal but little concerned with hardware and the like.

### GB3GV

As you saw from the Convention report in the last issue, the Leicester repeater is almost ready to go. Although a lot of work still has to be done to the project as a whole, the machine can be up and running quite soon after the licences have been received. The site will be in Glenfield to the West of Leicester.

### GB3TV

Not much is known about this one either. I believe that some hardware is done and work is continuing. FM has again been chosen after many tests and experiments. Site should be Dunstable Downs.

### GB3UD

The Stoke lads - although the first on the TV repeater scene - have been put-off by the interminable delays concerning the licence applications. Some hardware has been bought and once again FM has been chosen. Interest and intention are still keen and, once the licence arrives there will be some feverish activity.

It is hoped to be able to report more fully next time and more regularly in the future, PROVIDING the Editor is given the information. Come on chaps, it's free advertising and you all need as many members as you can get.

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## NEW A.T. V. BOOKS

by Andy Emmerson, GBPTH

The German ATV club, AGAF, have recently published their own ATV handbook. They kindly sent over a couple of copies for review, so here goes.....  
*ATV, Einführung in die Amateurfunk-Fernsehempfangs und Sendetechnik* is very clearly aimed at the beginner to ATV and is not intended as a grab-bag of more or less advanced projects for constructors. In 72 pages and seven sections it deals with TV basics, AM transmission and reception techniques for 70cm, FM-ATV, the 24cm band and the regulations affecting ATV operation. Illustrations are confined to block diagrams (no photo's or practical circuits) and to the Anglo-Saxon there seems to be too much emphasis on red tape like licence conditions and how to fill in contest logs. Your Editor was horrified at the amount of blank space, too; enough for another 15 pages worth of material! Nonetheless, the book does something which no UK publication does, viz. to compress into one handy book how and why TV works, and where ATV fits into all this. The AGAF have offered us free use of their publications for translation into English, some of which may be incorporated into a BATC book for beginners, which is badly needed. (Such a booklet is in preparation and should be available in the Spring. ed).

In the meantime, if you read German, you can see it first in this book. The price is DM 20 post free (about £5!) and can be obtained from the AGAF, Wieserweg 20, D-5982 NEUERADE, West Germany. International Money Orders are acceptable, also Giro transfers to account No. 1990 08 465 (Giro centre 440 100 46). Mention AGAF ATV Handbuch on the form.

In the USA "A5" magazine have published a compilation of information on ATV taken largely from the pages of "A5" magazine itself. A review copy has been promised and we hope to report on it in the next issue.



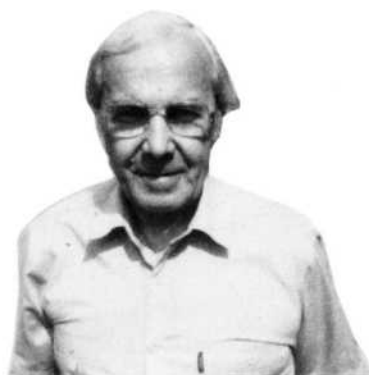
# A tribute to....

## C. GRANT DIXON M.A. G8CGK

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As reported briefly in the last issue, Grant Dixon has retired from the committee of the BATC after thirty years in office. This tribute has been compiled as a resume of Grants involvement in amateur television.

Grant Dixon first became interested in radio at the age of seven when he became adept at operating his uncles 'bright emitter' four-valve wireless on which he spent much time listening to the 'magical' transmissions. The first solo effort at radio came when he was eleven with the construction of a one-valver. This receiver sustained the early interest in radio for the next couple of years until, in 1929, whilst returning to school by train, Grant bought the first issue of "Practical Television" magazine from the station bookstall. This magazine was devoured from cover to cover by the time young Grant was deposited at his destination.



Later, in 1933-4, at boarding school, he was able to construct a 30-line disc receiver. By this time the idea of generating colour television was being aired in the learned journals of the day and Baird was experimenting with three sets of spiral holes and colour filters. Grant was able to make some suggestions for the improvement of the system then being tried, and it was recommended that these ideas be patented but, as with many original ideas this was not done.

In 1934, university called, and at Cambridge Grant soon joined the resident wireless society. Then came the war and all thoughts of television were abandoned.

In the immediate post-war period, thoughts again turned to TV and things were found to be very different from those of the thirties. Great technical advances had been made during the hostilities, in particular the field of radar and high frequency transmission equipment. Surplus equipment began to appear on the market such as; the VCR97 radar set, which proved very popular, it being fitted with a rather useful CRT. Using such a machine, Grant built a TV set to receive BBC transmissions from the Alexandra Palace and Holme Moss transmitters.

In 1949 Grant - by then a married man - moved to Ross-on-Wye in Herefordshire, and installed the receiver in a workshop. It was later decided that a TV set was required for the house and so a 9" "Practical Television" receiver was constructed.

In 1950 Grant read about the British Amateur Television Club (at that time just a small group), and wrote to the founder, one Mike Barlow G3CVO. BATC membership followed and in that year, Grant took a home-built (valved) sync pulse generator to the first BATC convention in London, which was attended by a grand total of twenty five persons.





Grants colour camera on display.  
Hobbies Exhibition, Ross-on-Wye, 1958.

In March 1952, it was decided to put the club on a more formal basis and a committee was duly elected. Grant became the Clubs first Chairman and presided over the drawing-up of the first constitution.

Later in 1952 he again became interested in colour TV and constructed a rotating colour disc monitor and a scanner. This system used the frame-sequential principle and had scanning standards of 150 lines and 100 frames per second. The monitor at first used a 5FP7 radar tube which was later replaced by an ACR8 white-screen tube. The scanner used three 931A photo-multiplier tubes to provide an RGB signal (using appropriate filters). The first colour camera came along in 1953 and used an Emitron tube, released to BATC members by EMI. The scan coil assembly was hand wound using many thousands of turns of wire. The camera employed a synchronous induction motor to drive the disc and phasing was achieved by altering the phase of the frame sync pulse in the timer unit. An illumination of around 400 foot-candles was required on a test card with the lens set to f4.5.

The first successful colour pictures were achieved by Christmas 1953, and were at that time closed circuit only. The system was reported in "Wireless World" magazine for April 1954.

History was made on the 8th of April 1956 when the complete colour system (minus the camera because it was too big to fit in the car!) was transported to the home of Mike Barlow G3CVO Nr. Chelmsford. The gear was set-up and a colour bar test signal was successfully transmitted, over the air, to Ralph Royle G2WJ 13 miles away in Dunmow. The equipment was then hastily dismantled, taken the 13 miles to G2WJs QTH, and the transmission was repeated in the reverse direction. These are believed to have been the first amateur colour television transmissions in the World and they were widely reported in the press.

## WHAT THE OTHER CHAP

### IS DOING

By Chester Drans.

WE'VE DONE IT AGAIN! Since Christmas we have had the first two-way live camera to live camera transmission AND the TV DX record has been put up to 38 miles - Ian Waters G0KND/T receiving pictures from G2DUS/T at Baldock. But on April 7th-8th we really made history..... see the headlines:

## Colour TV—by amateurs

THE first colour TV pictures ever transmitted by amateurs in Britain were exchanged yesterday.

Transmitter and receiver were 13 miles apart, said Mr. M. W. S. Barlow, of Great Bardock, Essex, secretary of the British Amateur Television Club. And he claimed it was a world record.

One of the amateur stations is operated by Mr. Barlow, the

other by Mr. R. L. Boyle and his 21-year-old son, Jeremy, at Great Canfield, Essex.

The colour equipment was built by Mr. C. J. Dixon, of Ruislip, Wye, Middlesex.

### Discarded

Results in both directions were excellent, said Mr. Barlow. A short wavelength in the 18 cm amateur band was used. Mr. Barlow explained: "The

pictures were seen on a domestic TV set in black and white and on a home-made colour receiver, using a rotating colour wheel.

The system we use is one discarded by the American stations some time ago. It is nothing like the one used experimentally by the B.B.C. This had a colour-receiving tube which could accept light. The club has six members all over Britain. 71 of them licensed to transmit pictures.

## AMATEUR USE OF COLOUR TELEVISION

### PICTURE 13 MILES AWAY

British amateurs yesterday transmitted and received television pictures in colour. Transmitter and receiver were 13 miles apart.

Mr. M. W. S. Barlow, of Great Bardock, Essex, said that station G2DUS/T, at Dunmow, transmitted station colour pictures to station G0KND/T, near Chelmsford, by means of home-made colour equipment built by Mr. C. J. Dixon, of Ruislip-Wye, Middlesex. The pictures were seen on a domestic television set in black and white, and on a home-made colour receiver, using a rotating colour wheel alongside.

Results were excellent. Mr. Barlow continued: "For these experiments a very short wavelength in the 18 centimetre amateur band was used for transmitting. Later on the day colour signals were sent in the amateur air space."

G2DUS/T is the transmission station operated by Mr. P. F. Boyle and his son, Mr. Jeremy Boyle, at Ruislip-Wye, Great Canfield, Essex. G0KND/T is the station operated by Ian Waters, at his home at Baldock, Herts. Station G2DUS/T is



(Article) excerpt from The Times.

(Article) excerpt from the Daily Herald.

Other national newspapers carrying the story included: Manchester Guardian, News Chronicle, Daily Mail, Daily Express.

Many provincial papers have also carried the story.

Reprinted from CQ-TV 28 1956

Grant became aware of Slow-Scan TeleVision in 1959 when he heard of the narrow-band TV system being developed in America by Copthorne McDonald. A SSTV monitor was soon constructed which was only the second such unit in the country. Demonstrations of SSTV followed using a tape provided by Cop. McDonald. From this time on Grant was hooked on SSTV and, mainly because of a lack of ATV activity in the area, fast scan TV took a back seat.

On the 8th of September 1962, after 10 years, a new BATC Chairman - J. Ware - took over from Grant. This is the message that the new Chairman published in CQ-TV49:-

"..... I wish to offer the highest praise to my predecessor Grant Dixon who in a sense will always be regarded as one of the fathers of the club. A man who has found time amid a life where all his patience is required in the work of his profession to foster our interests from a handfull of members to the present number - in excess of 600. It is indeed a splendid chap who gave so much of his energies for such a very long period of years to deal with problems from Ohms law to important policy matters of the club with such excellent result.

John Ware.

At about this time Grant took over the BATC library. This was a trifle sparse but gradually it expanded to include a variety of publications, records and lecture tapes. Later on when Club Sales (as it was then known) and Publications became separate departments, Grant took over the club sales. He continued with these jobs until they were passed on in September 1981.

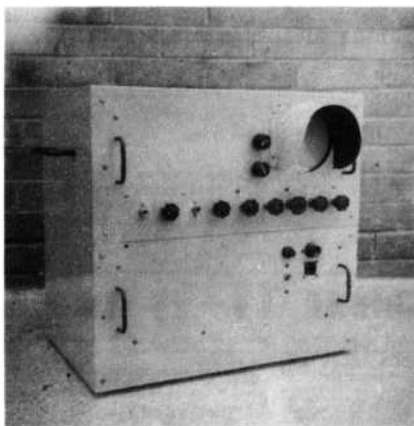
In 1968 an SSTV vidicon camera was built using a 7290 tube. By 1970 the first transistor monitor was developed. This went through a number of changes and finally appeared as a standard design which was made available to others by marketing a set of three printed circuit boards.

The first SSTV convention took place on the 11th of October at Birmingham which Grant helped to organize. This was just one of the many functions at which Grant has exhibited his SSTV equipment in recent years.

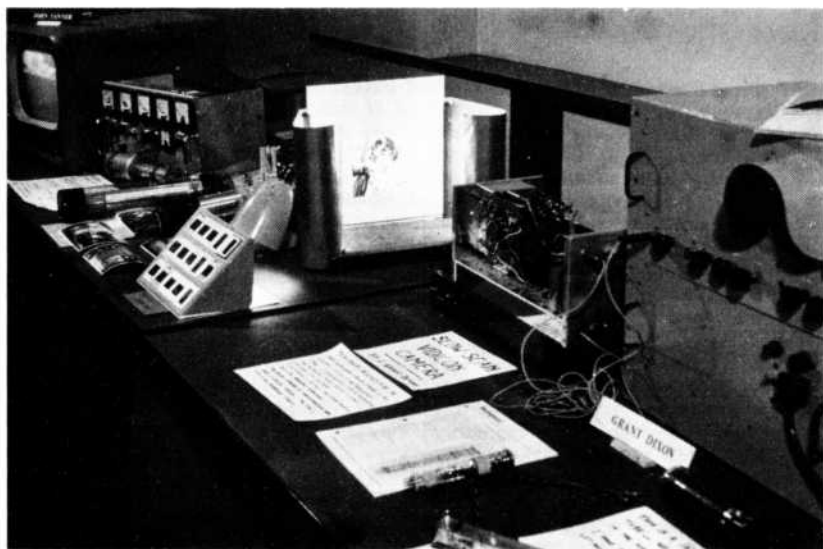
In 1979 an interest in computing was developed and, after the construction of a suitable machine, (the Triton) during the period 1980-81 the SSTV equipment was interfaced with the computer. Recent work has been to produce 'hard copy' prints of SSTV pictures after having been suitably processed by the micro. Examples of this work may be seen in CQ-TV113 and elsewhere in this issue.

This short piece can merely touch on the more significant events in Grants life, but I'm sure it will illustrate the enormous debt that the BATC and amateur television owes to this man. His enthusiasm and technical expertise has been an inspiration to many over the years and will I'm sure continue to be so in the years to come. Grant has been made a life member of the BATC and, to mark his retirement from the committee was presented, at the last convention, with an engraved crystal wine glass as a memento of the last thirty years. Furthermore the committee has decided to institute a special award for literary talent called "The Grant Dixon Award".

Grant - the BATC thanks you and hopes that you will continue to play an active part in ATV for many more years.



Grants first SSTV monitor, built in 1960.



Slow scan television display at the 1964 BATC Convention.

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.....	2/3" EMI 9831 Vidicon - amateur grade	Temporarily discontinued		
.....	1" EMI 9677 Vidicon - amateur grade	£15:50	nil	.....
.....	1" EMI 9728 Vidicon - amateur grade	£15:50	nil	.....
.....	1" EMI 9706 Vidicon - amateur grade (5" type)	£15:50	nil	.....
.....	4½" EMI 9565 Image Orthicon	£10 per2	collect	.....
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.....	2/3" Vidicon scan-coils	£6:00	0:80	.....
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.....	BATC test card - latest - with instructions,	0:50	0:24	.....
.....	BATC reporting chart (illustrated)	0:12	0:20	.....
.....	BATC lapel badge - diamond - button hole	0:40	0:16	.....
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.....	5MHz SPG crystal (P100)	£2:75	0:25	.....
.....	TBP28122 PROM, pre-programmed for colour test card circle. (eqt. 74S471)	£10:00	0:25	.....
.....	TMS4036 memory IC for char. gen. memory board. (until stocks are exhausted)	£5:00	0:25	.....
.....	4.433618MHz PAL colour subcarrier crystal*	0:40	nil	.....
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\*surplus, untested.

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.....	AMATEUR TELEVISION HANDBOOK vol.2 by T.Brown, G8CJS	£2:00	0:40	.....
.....	CQ-TV BACK ISSUES. The following issues are still available although stocks of some are low. Please circle those required.			
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	93,94,95,96,97,99,100,101,102,103,105,106,107, 108,109,111,116,117,118,119,120.....	0:50	*	.....
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## AUSTRALIA

Would Australian members please note that the "Amateur Television Handbook vol.1. is available direct from the Wireless Institute of Australia at: PO box 150, Toorak, Victoria 3142. Please enquire for volume 2.

All other orders please to:- BATC Publications, 14 Lilac Avenue, Leicester LE5 1FN.

name	call
address	
	post code



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Please send this form, together with your remittance to the Hon. Membership Secretary, 13 Church Street, Gainsbrough, LINCS.

I wish to join the British Amateur Television Club.

Initials	Surname	Callsign
Address		
		Post code

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Tick	<input type="checkbox"/>	Jan to Dec 1983 plus all 1984	£8.00		
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\*Later in the year, it may not be possible to supply all the back-issues for that year, therefore others may need to be substituted.

The following items may also be ordered on this form:

qty..... Lapel Badges at 50p each.....£

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(The most recent issues available will be sent unless specific numbers are requested)

TOTAL REMITTANCE ENCLOSED £                     

Please pay by cheque, Postal Order or Money Order, made payable to B.A.T.C. Overseas applicants are asked not to pay by foreign cheques, but by cheques drawn on a London bank or by International Money Order.

Signed.....Date.....

Note: Orders for other Club Services items should be sent separately. Details and an order form are with each issue of CQ-TV magazine.

(OFFICE USE)

Date	Receipt No.	Treasurer
Mag's sent	Cash Received	Computer list

CQ-TV121





The picture shown above illustrates how a computer and a printer can be used to produce 'hard copy' pictures from a frame of slow-scan TV. This shot of Grant Dixon was produced using an Epson MX80 F/T III printer using the single density mode. The video is processed in a home computer and was made under closed circuit conditions. On the next page is a picture of DF1YQ as received by Grant on the 14th Sept 1982 during a 2m opening. As you can see there was a certain amount of noise present on the signal.

Both pictures are 128 x 128 pixels and each pixel is represented by a matrix of 4 x 4 dots. The original pictures measure 7" x 7".



DF1YQ



Photograph taken directly from the  
TV screen of the picture from which  
the above computer processed print  
was made.

# T. V. I. ?

Do you suffer from television interference from your 70cm ATV transmissions? If so, this simple solution - which has been around for many years - may help.

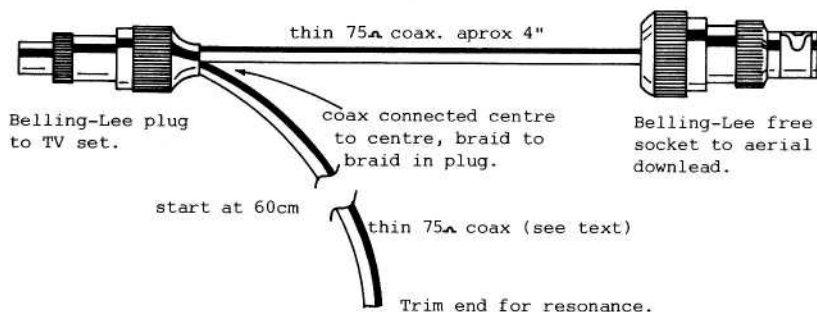
First, make sure that the interference is coming down the TV aerial lead. To do this, switch on the transmitter and monitor the TV interference. Then simply pull out the TV aerial plug. If the interference disappears, along with the programme, then it is probable that your 70cm signal is "blasting" down the TV aerial.

In this case a filter to remove the 70cm is required that does not attenuate the wanted TV programmes. An easy way to do this is simply to use a  $\frac{1}{4}$  wave coaxial stub at the TV aerial socket. Being a multiple of  $\frac{1}{4}$  waves, the 70cm will be "shorted out" but not the wanted signals since they are on different frequencies. A  $\frac{3}{4}$  wave stub is used, rather than  $\frac{1}{4}$ , as this will also be a  $\frac{1}{4}$  wave at 2 Metres which means that you can do two bands for the price of one!

Cut a piece of thin coax about 60cm long and wire it as shown in the diagram.

There are two ways of aligning the stub; either using the stub 'in situ' and trimming the free end about 1/8th of an inch at a time until the interference disappears, or, insert the stub at the aerial input of a 70cm receiver, tune in a fairly strong signal (beacon, repeater etc.) and trim the stub for maximum attenuation of the signal. Put this at the back of the TV set and 'presto' the TVI should have gone. Can't be that simple? You just try it.

To finish it off, the stub itself may be coiled around the loax link and taped over to make it neat. It is a good idea to lay in a small (or large!) stock of these so they can be handed out if you receive any complaints.



# CONTEST NEWS

This years International ATV contest, held on the second weekend in September, was blessed, for the first time ever?, with quite good conditions. For those in the South-East corner, contacts were possible with DL, ON, PA and F stations for most of the contest with best conditions being on early Sunday morning. Stations further than 40 miles North of London saw little of the DX and many operators in the South-East were caught out by the positive modulation from French stations. The only other area that was at an advantage, was the North-East coast, and the best DX contact there was between G3PTU (ZN32J) and DF2BJ at 582 kilometres.

Congratulations anyway to G3WOR/P who operated from their local 'ideal' site on the South Downs just North of Worthing and whose score must surely mean that they will be well placed when the International results are published.

Although I have no reports from GM, it is good to see GU8FB0 appearing in some of the logs.

Still little activity on 24cms, although congratulations to G3YQC on his entry! Let's hope that by next year the repeaters will be on the air and that this will serve to increase the number of stations active on that band.

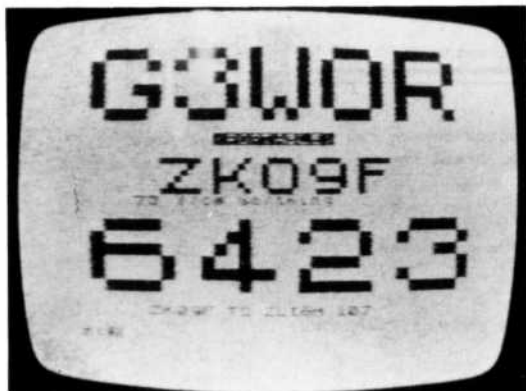
My thanks are due to Ian Waters, G8ADE from Nr. Cambridge, who sent in a check log together with some photo's.

## SUMMER CUMULATIVE - 1983

As soon as I see the RSGB contest diary for 1983, I will sort out some dates for a May/June contest when, hopefully, we will again be enjoying a good old British summer!

Happy new year.

Graham Shirville, G3VZV.



Photo's taken during the International contest by G8ADE Nr. Cambridge.

## RESULTS.

## 1982 INTERNATIONAL ATV CONTEST

(British Section)

## SECTION 'A' - 70cm

POSITION	CALLSIGN	POINTS	QRA	POWER	QSO's	BEST DX
1	G3WOR/P	13383	ZK09F	150	55	DL9EH - 515km
2	G6CAQ	10400	ZL39G	400	56	F3YX - 367km
3	G8DTQ	8667	ZL60E	300	46	F3YX - 330km
4	G8RZO	6764	AL45F	400	35	PA3BPH - 255km
5	G4ARD/P	6206	ZL18H	100	38	ON6AR/T - 348km
6	G8MNY/P	6198	ZL26F	180	36	F3YX - 398km
7	G4CRJ	6194	ZL38B	150	29	F3YX - 365km
8	G8GLQ/P	4640	YL57G	150	29	G3RZO - 254km
9	G8ZWM/P	4283	ZL80G	25	29	G8GON/P - 246km
10	G3YFO	3426	ZL37D	100	26	ON5ID - 321km
11	G4NPS	3200	ZN40E	50	13	PA3CGN - 487km
12	G4BVK/P	2270	YL48C	150	18	G8DTQ - 162km
13	GW8GIZ/P	2233	YN65H	20	26	G4DYP - 100km
14	G3YQC	1801	ZM54B	12	14	G8ZWM/P - 163km
15	G8CHK	1430	ZM65C	80	18	G3WOR/P - 150km
16	G3PTU	1363	ZN32J	10	7	DF2BJ - 582km
17	G8CQE	1275	ZL50D	50	22	G3UMF - 88km
18	G4NGV/P	810	YN29E	10	11	GW8GIZ/P - 74km
19	G4HJD	326	ZN19F	20	4	G8PTV - 87km
20	G3YBK/P	135	YK05A	3	3	G8GON/P - 43km
21	G8VBS	134	AM64G	50	2	G4ARD/P - 90km
22	G8ZQF	86	YL38F	25	3	G8GLQ/P - 26km

## SECTION 'B' - 70cm

1	BRS36591	374	YN38E	-	-	GW8GIZ/P - 124km
---	----------	-----	-------	---	---	------------------

## SECTION 'A' - 24cm

1	G3YQC	1140	ZM54B	40	4	G4ARD/P - 70km
2	G4ARD/P	1124	ZL18H	50	5	G8MLA/P - 97km



Photo's taken during the International contest by G8ADE Nr. Cambridge.

# TV REPORTING CHART

Members who are at present using the old BATC reporting chart will be aware that it is not entirely suitable for amateur applications. The problem is that the chart is based on picture reporting standards used by the broadcasting authorities. In entertainment broadcasting the requirements for reporting the picture quality differ widely from those for amateur transmissions, since the broadcaster is dealing with predominantly high signal levels, whereas the amateur is dealing with much weaker signals. Obviously a system more suited to amateur applications is required. This new chart, shown opposite, has been developed by A5 ATV magazine and will enable TVers to give more meaningful reports on received signals.

The chart is still based on the British standard 0 - 5 scale and the photographs show whole picture points. In practice, pictures will often fall between two steps, in which case  $\frac{1}{2}$  point steps may be used. These  $\frac{1}{2}$  steps are not illustrated but with a little practice, will be easily judged.

Due to the printing process used on this journal, some of the differences in picture noise may not appear too evident (for example, little difference may be noticed between P4 and P5) in this case an approximate estimation will be required.

I am sure that everyone will be pleased to see this new chart and will find it more appropriate to amateur TV reporting.

My thanks to A5 Amateur Television magazine for permission to reproduce this reporting chart.

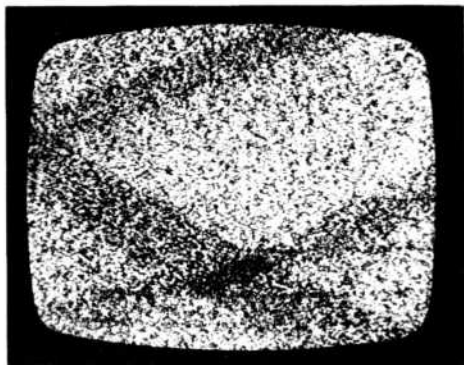
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## Are YOU on 24?

Now that an increasing number of stations are becoming active on 24cm TV, it is apparent that the new activity is largely concentrated in isolated groups.

Many enquiries have been received asking for some indication of where the active stations are located. It is intended therefore, to publish these details (perhaps in map form like the previous highly successful one) in Andy's "TV On The Air" column.

If you are active, or hope to be active on that band, would you please send brief details of yourself (and perhaps others who are known to you) to Andy Emmerson G8PTH, 4 Mount Pleasant, Blean Common, Canterbury, Kent CT2 9EU (tel: 0227 77 471).



P0 Total Noise Visible. No picture at all or detectable Video Sync Bars.



P1 High noise visible. Weak picture.



P2 High noise visible. Fair picture. Fair detail.



P3 Noise Visible. Strong picture. Recognizable detail.



P4 Slight noise visible. Very strong picture. Good detail.



P5 No noise visible. Closed circuit picture. Excellent detail.

(JANUARY 1983)

Published with permission of A5 ATV MAGAZINE, P.O. BOX H, LOWDEN, IA 52555

Photos by Dave Williams WB0ZJP



# A TV RECEIVER

by Peter Delaney G8KZG

Recently available on the surplus market is an RBM TV IF strip, (Manor Supplies, 64 Golders Manor Drive, London NW11), which uses a single chip to perform all the stages of IF amplification and audio and video demodulation, with a gated AGC and DC coupled output, and a DC volume control circuit. The circuit and layout are shown in fig's 1 and 2.

To enable the board to operate as a receiver for video and audio output, the circuit in fig.3 was developed. Syncs are fed in at P11 and used to turn on Tr3 during the line sync period. IC1 is a NE555 timer which is used as an oscillator and is locked in frequency and phase to the received synchronising pulses. This is done by Tr3 altering the level of the upper comparator in IC1 (via pin 5). With no input to P11, Vr2 is set to just over a line period in duration (64uS) - this ensures good locking of the received signal. Tr4 uses IC1's output to drive T1 which acts as a load to produce a large voltage, narrow pulse, to open the IF strip AGC gate (via P6) and also from its secondary to provide an extra voltage to produce the 30v tuning supply.

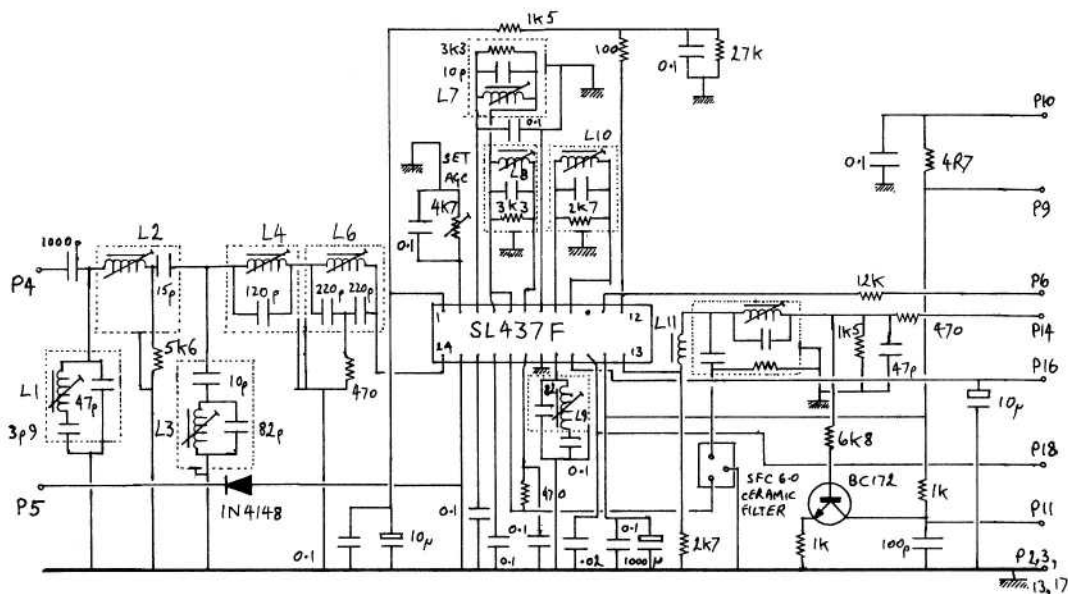


Fig. 1

Z714 I.F. PANEL CIRCUIT DIAGRAM

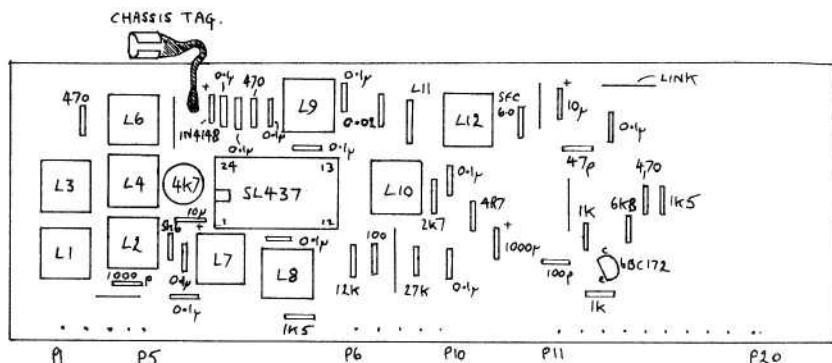


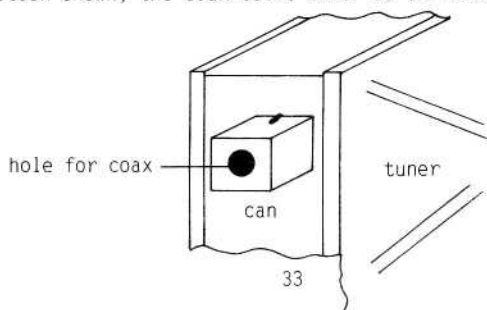
Fig.2

### I.F.STRIP COMPONENT LAYOUT

Vr5-8 are preset multiturn potentiometers, and are used to tune the broadcast channels, an extra control may be fitted preset to the IF output of a 70cm ATV up-converter if required. Vr4/R25 enables the tuner to tune directly to the 70cm band although it may be found that some ELC1043 type tuners will not tune low enough. Tr5 provides the audio output delivering two different levels. H is suitable to drive the line input of a monitor (approximately 0dBm) whilst L will match directly to the audio input of most video recorders. The level is preset by Vr1 (acting on the IF strip). Tr6 and Tr7 provide the video output at the standard 1v p-p level, R21 and R22 ensure correct matching into a 75 Ohm load. Vr3 sets the AGC for the tuner. Capacitors C15 and C16 should be mounted close to the ELC1043 pins. To set Vr3, disconnect P5 and adjust Vr3 for maximum video output (trim for best colour burst), then, reconnect P5 if AGC is required.

The components R1-R23, C1-C18 and C23 (not C9), Tr1-7 and IC1 are all mounted on a printed circuit board, the component plan of which is illustrated in fig.4. The upper side of the board is left as plain copper to provide an overall earth plane. The holes for component wires not earthed should be countersunk slightly with a drill to ensure that the leads do not short to ground. A screen made from PC board material, about 2cm high, is fitted as indicated on fig.4. The screen is soldered to the component side of the PC board. IC1 is fitted into soldercon pins. T1 is an audio driver transformer. The Tandy part 273-1378 was used in the prototype and has the advantage of being cheap!. Tr7 needs a small, finned, heatsink. The legs of the tuner should be soldered to the earth plane.

To screen the aerial input to the tuner, a spare 6mm IF can may be soldered into the position shown. the coax cable outer is soldered to this can.



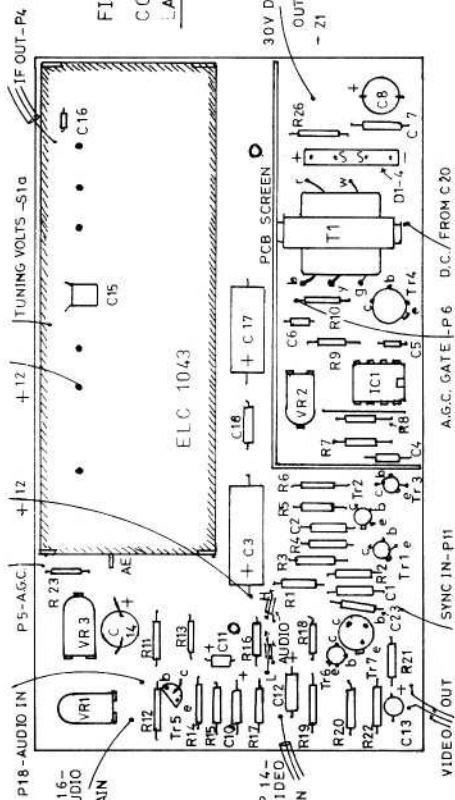


FIG 4  
COMPONENT  
LAYOUT

SOLDER EARTHED POINTS TO BOTH SIDES OF BOARD

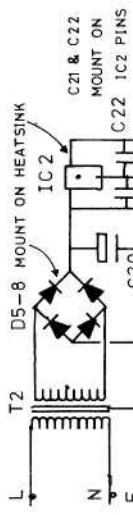
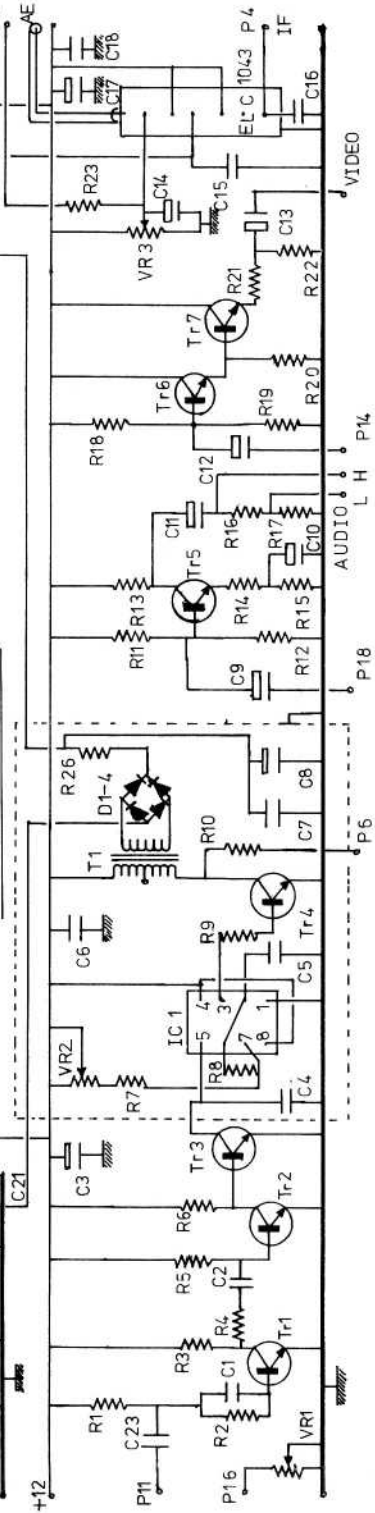


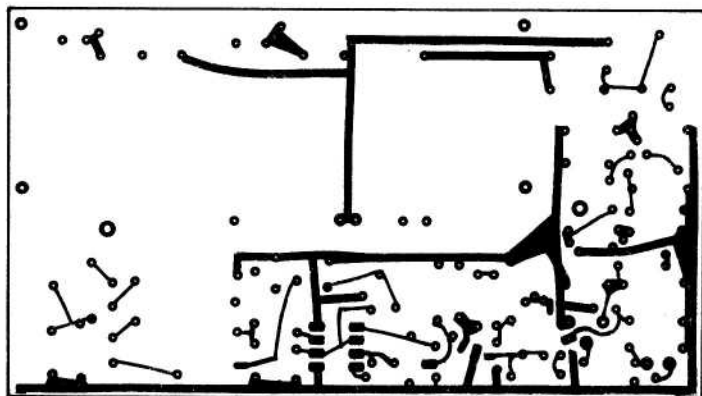
FIG 3 CIRCUIT DIAGRAM ( P = POINT ON Z74 )



The prototype was originally intended to give a monochrome output (the IF strip is from a monochrome portable). However it is found to give good, clear colour pictures on broadcast signals.

#### PARTS LIST

IC1	NE555	R1	680k	C1	0.01 disc ceramic
IC2	7812	R2	2.2k	C2	1n " "
		R3,5,6,25	10k	C3,9,12,17	47uF 16v axial
Tr1	BC108	R4,17	1k	C4	0.01 mylar
Tr2,3,6	BC109	R7	18k	C5	2.2n disc ceramic
Tr4	BF178	R8,20	1.8k	C6,15,18	0.1 mylar
Tr5	2N3705	R9,22	270R	C7	0.22 polyester
Tr7	2N3053	R10,12	47k	C8	10uF 40v axial
		R11,18	100k	C10	10uF 6v tant
D1-4	BY164	R13,14	820R	C11	100uF 12v tant
D5-8	1N4001	R15	680R	C13	47uF 12v radial
Z1	TAA550	R16	9.1k	C14	10uF 12v radial
		R19	220k	C16	10pF min ceramic
T1	see text	R21	110R	C20	4700uF 40v radial
T2	15v 1A	R23	2.7k	C21,23	0.22 mylar
		R26	1.2k	C22	0.47 mylar
Vr1	22k hor.	all $\frac{1}{4}$ W 10%			
Vr2	10k hor.			Z714	I.F. strip (see text)
Vr3,4	1k hor.			ELC1043	tuner (Manor Supplies)
Vr5-8	100k multi.				
S1	2pole 6 way				



PRINTED CIRCUIT LAYOUT (enlarge to 130mm x 73mm)

# CIRCUIT NOTEBOOK

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Number 35

by John Lawrence GW3JGA

Here is another useful little circuit from the GW8PBX stable which will be of interest to those of you who are experimenting with the gen-locking of colour signals. It might even be called "The poor man's Vectorscope".

The circuit is based on two John Goode video switch elements which allow a locally generated colour signal to be gated into an off-air signal for local colour subcarrier phasing adjustment.

The input signal requirements are shown in the diagram, the field drive and mixed blanking are taken from the local S.P.G. which will already have been gen-locked to the off-air signal.

The output of the circuit carries off-air syncs, colour burst and the bottom half of the picture active line information. The circuit gates in local video on the top half of the screen, active line only.

The display enables local colour bars to be phased correctly by adjusting the phase of the local sub-carrier oscillator for correct and maximum saturation.

David (GW8PBX) tells me that the circuit was used for testing his "Burst Locked Colour Sub-carrier Generator for use with the Project 100 S.P.G." I understand that this beast (and possibly a P.C.B.) will be featured in CQ-TV shortly.



The operating  
position at  
F3YX.





**Q1**

"European ATV'ers are going to "FM video" on 1200 and 2300 Mhz. What are the advantages and disadvantages of FM over the present AM video methods?

**A**

**Advantages;** Above carrier to noise ratios of about 10db, the picture signal to noise (snow) improves at a much faster rate. The limiter in a FM IF is most responsible. With AM, the picture signal to noise rate is the same as the carrier signal to noise rate. Example; An AM 100-watt ATV signal from a 10-watt rig using a linear amplifier will show about a 10 db improvement or like going from P2 to P4. With FM under the same circumstances, it may go from P2 to P5. It is much easier to increase power because the modulator is the same back at the oscillator. Good efficiency class C amps can be added anytime without worrying about linearity or going to higher level power modulators. At microwave frequencies, there are many devices such as varactor multipliers, Gunnplexers, reflex klystrons, DRO's, etc. that FM's easily where AM doesn't work well at all. **Disadvantages;** Mostly operational, it takes a whole new receiver, the slope detection method we used to use in the early days on 2 meters with our AM receivers gives very poor results meaning our downconverters into standard TV sets won't do it and inhibits growth in ATV. Advanced Receiver Research has a nice 70 Mhz. FM video IF strip system (RXV70VD) for just under \$100. It was made for 10 Ghz. Gunnplexer systems and should work well for any other microwave receiving systems including TVRO's. Bandwidth is the biggest disadvantage and is why it is used only on microwave frequencies. The rule of thumb for FM is the occupied bandwidth 2 times deviation plus 2 times the highest modulating frequency. If a 4.5 Mhz. audio subcarrier is figured with 10 Mhz. deviation (same as on satellites), then 29 Mhz. is necessary  $(2 \times 4.5) + (2 \times 10)$ . This doesn't leave much room in the 400 and 1200 Mhz. Amateur Bands to allow simplex, repeaters or other modes. On the 2300 Mhz. band, 2400 is simplex AM, 2380 simplex FM and 2325/2425 repeater AM or FM. If it wasn't for FM preemphasis and deemphasis, the noise floor would be about 8 db higher than normal AM just due to the bandwidth. Another disadvantage, with the 10 Mhz. deviation-it is difficult to be xtal controlled without using a stable varicap modulated free running oscillator and mixer system, or a phase locked loop. A popular British system designed by G3YQC uses a modulated trough line transistor oscillator at 420 Mhz. followed by power amplifiers and varactor triplers. With this method, one must have a frequency counter to make sure the oscillator doesn't drift off the band.

This item is reproduced directly from the pages of "A5 Amateur Television Magazine" for December 1982, and is by courtesy of the Editor, Mike Stone, WB0QCD.

**EDITORS NOTE:**

*The above reply assumes a carrier deviation of 10MHz. There is no "amateur" standard at present operating in Europe but, experience has shown that a deviation of the order of 3.5MHz is adequate for our purposes and it is likely that a figure of this order will eventually be adopted. (see letter, CQ-TV 120 page 3).*

*The oscillator referred to was not in fact designed by me although my own FM-TV system is based around it. Full details of the design may be found in the "Amateur Television Handbook" volume 2.*

# THE GRANT DIXON AWARD

This award is being established to mark the retirement from the BATC committee of Grant Dixon, G8CGK after more than thirty years in office.

The award will be for the best article (in the adjudicators opinion) to have been submitted for publication to CQ-TV magazine. Judgement will be made not so much on the finished article (since the Editor may have contributed a fair amount of work), but rather on the article copy as first received by the Editor. The judges will be looking particularly at the following points:

Subject matter, general approach, literary style, artwork, layout and overall presentation.

The adjudicators will be Grant Dixon himself and the Editor of CQ-TV magazine. Their decision will be final.

A trophy will be awarded to the winner which will be his (or hers) to keep. In addition, a second trophy, held by the BATC, will be engraved with the winners name and call sign, and will be displayed at public functions. The prize will be awarded every other year and the winner will be announced at the BATC's biennial Convention.

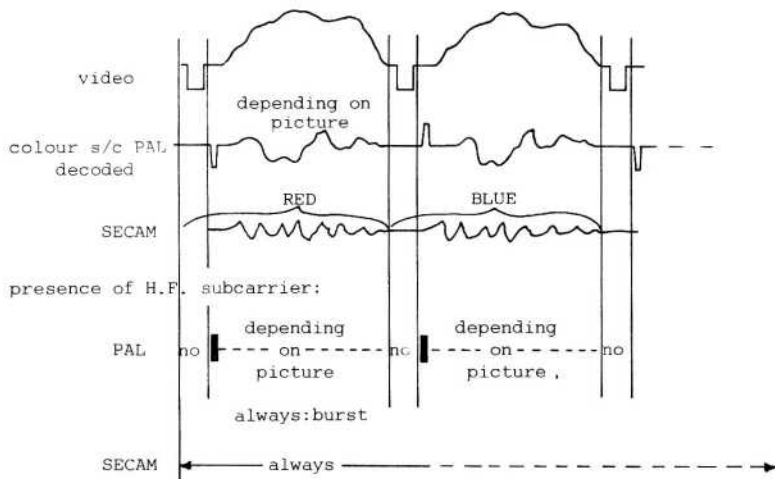
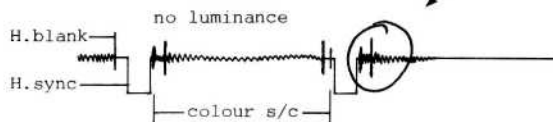
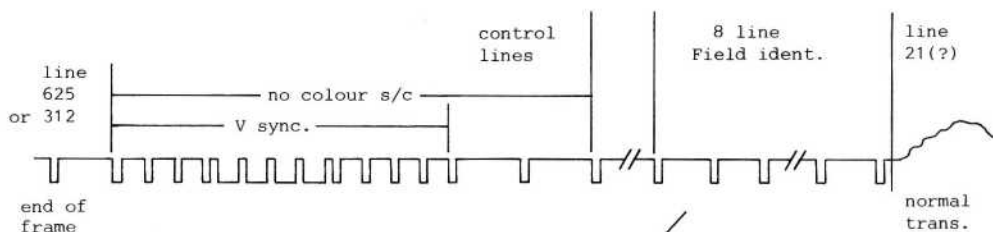
All articles appearing in CQ-TV magazine during the two-year period between conventions, will be considered unless the author requests otherwise.

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## PAL and SECAM

by Alain Picaud F6BFY.

The main difference between Secam II and Secam III lies in the abandonment of field identification: The two subcarriers, B-Y and R-Y are transmitted alternatively, B-Y during one horizontal line, then R-Y during the next and so on. To ensure correct synchronization of the receiver, the simplest method is to detect the difference in the frequency of the two carriers: At line blanking, there is no picture transmission, therefore no colour, in fact to "clock" the FM decoder, the transmission takes place immediately after the end of the horizontal sync pulse (exactly at the time the PAL burst would begin). Since there is no colour, the frequency is always the idle or  $F_0$  frequency, i.e. 4.250MHz for  $F_0$  blue or 4.40625Hz for  $F_0$  red (272 FH or 282 FH respectively). This minor difference is now used on all modern Secam decoders to identify whether the beginning line will contain "blue" or "red" information. Note that from the first of January 1981, all TV sets sold in France must comply with that regulation. The reason is the birth of the 4th channel which could eventually happen in 1982 or later. Another reason will be explained as follows: The old French system used "field identification" during field blanking, eight lines contain only a subcarrier signal which has the shape of fig.1 and whose frequencies are opposite to those representing a 100% saturation in blue or red (looks very much like the PAL or NTSC vectors at burst time). This system has the advantage of being very stable since the two frequencies are quite different, but also the big disadvantage that it occupies no less than eight lines which are lost for other transmissions (Antiope or Ceefax etc). In France, field identification will no longer be transmitted after about



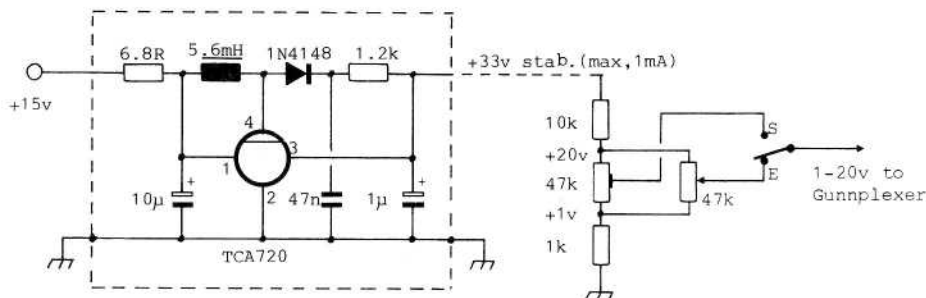
COMPARISON BETWEEN PAL AND SECAM: 2 LINES

nine or ten years, when the current sets will be supposed to be dead (if they still survive they will display a black and white picture). At this moment countries using Secam only use line identification. When I receive the USSR on band I in June 1981, my receiver gave a black and white or a yellow (!) picture. I had to use my PAL converter to recover colour (when the propagation was good enough).

I personally regret that my country has chosen Secam which indeed gives excellent results but technically its advantages are challenged by those of PAL and commercially it is a failure. I have DX fans and "video freaks" among my friends and we have our idea about the performance of PAL, NTSC and Secam. (by the way I have easily modified my first-generation PAL VHS to make it usable for NTSC. The description is available to members free of charge from: 107 Rue De Reuilly, F75012 Paris, France.

# HANDBOOK-2 NOTES

Owing to an unfortunate oversight, the circuit for the DC/DC power supply, which should have accompanied the 10GHz Transceiver article in vol.2 of the Handbook, was left out. Insert sheets have been printed and are being issued with new handbooks, however, for those who purchased their copy before the error was discovered, the missing circuit is shown below. Sorry!



10GHz GUNNPLEXER SUPPLY CIRCUIT

## 24cm NOTES

by Andy Emmerson, G8PTH

If UHF constructional techniques are difficult to learn from books at 70cm, then the problems become greater at 24cm. One solution is to use commercial equipment and a wideband QRO linear amplifier has now been introduced for the 23 and 24cm bands. Sold by Mutek Ltd of Bradworthy, Devon it is made in Sweden. The drive input is 10 Watts for around 150W output. This PA is based on the W2CQH design and uses two 7289 or 3CX100A5 valves, with an anode voltage of typically 1 to 1.5kv at around 300mA! The PA is constructed to very high standards, largely from solid brass: It looks superb and we hope to bring you a full report soon. It is sold without valves and you build your own power supply, blower(s) and cabinet. Price is a little below £200 which is realistic for a product of this quality (and minority appeal). Further details from Mutek, Bradworthy, Holsworthy, Devon EX22 7TU. Tel: 0409 24 543 (please mention CQ-TV when requesting information). Mutek also sell high-quality preamps, dish feeds and power dividers for 1.3 GHz.

If you're interested in 1.3 GHz (and if not why are you reading this?), have you seen the RSGB Microwave Newsletter? The cost was due to change just before going to press; it was £4 and comes out more or less monthly and is full of useful information. Contact RSGB headquarters (don't forget they are now at Potters Bar) for further details.

Radar interference is sometimes experienced by ATV operators on 24cm; it seems to effect AM transmissions more than FM, (there's a good reason for this, think about it - CLUE - limiting. ed). The station at Clee Hill in Salop is often cited, though not much seems to be known about it. From *Principles and Practice of Radar* (Newnes, 1963) some information has been extracted which may shed some light. The Radar using this band (L-band) is known as Tacan, where aircraft can interrogate a beacon for direction finding purposes. Aircraft call in on one of 126 channels in the range 1025-1150MHz and the beacon replies on a channel in the range 963-1024 or 1150-1213 MHz. Peak output power of the beacon is about 5kW, and is derived from a high-gain klystron feeding a vertical dipole stack. The feeds of the individual dipoles are phased to give an upward tilt to the beam, maximum power being radiated at an angle of 5 degrees above the horizon. The sets used on aircraft used 2C39 valves in cavities and ex-US air force equipment of this type turns up occasionally on the surplus market (not often enough!).

# AMATEUR TELEVISION HANDBOOK VOL. 2

VOLUME 2 OF THE POPULAR HANDBOOK IS NOW AVAILABLE.  
CONTENTS INCLUDE:- SLOW-SCAN TELEVISION, ASCII KEYBOARDS, CHARACTER COLOURIZER, SYNC PULSE GENERATOR, VISION MIXER, COLOUR SYNTHESIZER, 70cm VSB TRANSMITTER, 24cm FM TV STATION PLUS LOTS MORE.

Copies are available, price £2 plus 40p postage, from BATC publications department.

## PRINTED CIRCUIT BOARDS

At present, the only printed board available for projects in volume 2 is the keyboard "Piggy Back" board. This is priced at £2.25p plus 20p postage from Members Services. More PC boards are being designed and details will be published when available. Meanwhile, those members wishing for advance notice of board availability, should list their requirements on a self addressed, stamped postcard and sent to Members Services. When the boards become available, prices will be entered onto the card and returned to you.



# CHARACTER MEMORY

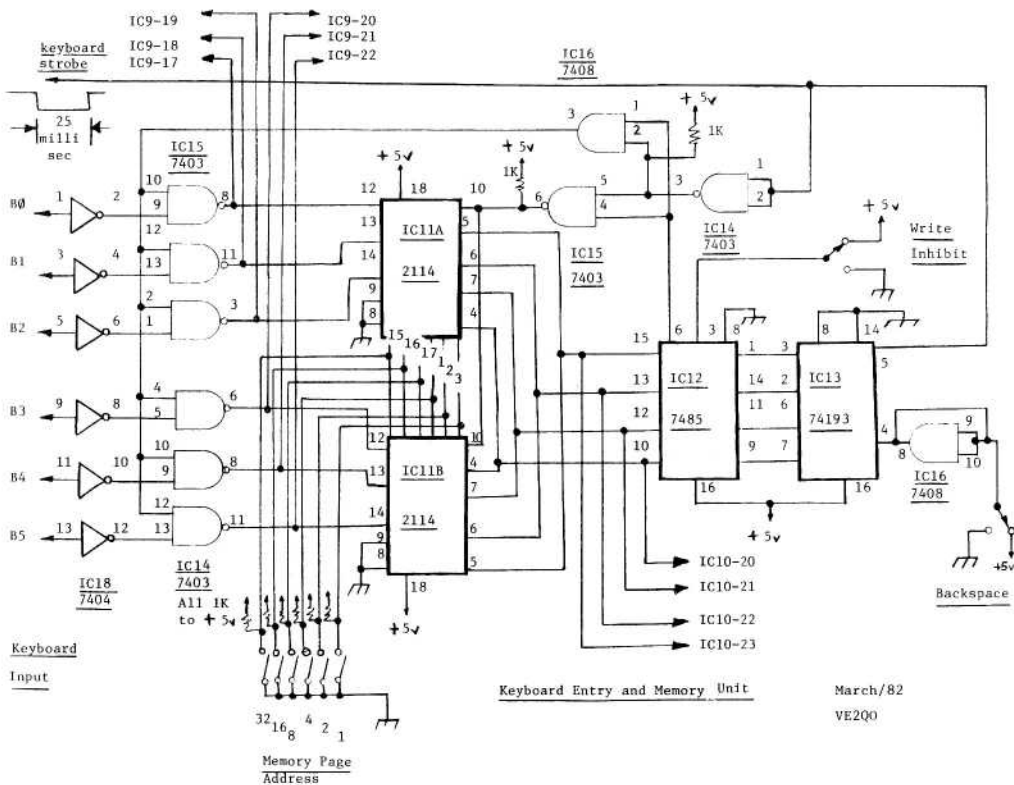
by Bruce Balla VE2QO.

The circuit shown below is a re-design of the (blue) "Handbook" character memory board (p.45), developed primarily to enable the more easily available 2114 memory IC to be used instead of the TMS4036 which is becoming increasingly difficult to obtain.

The circuit was also designed for use with an ASCII keyboard and, as a result, the "load advance" function has been removed.

The keyboard strobe duration shown in the diagram is 25mS. Since it is not normal for keyboards to produce a strobe pulse of this duration, it may be necessary to trigger (say) a 74121 monostable, with a 25mS time constant. Also ensure that the strobe pulse is of the correct polarity.

The design is intended for fast-scan TV use and will not be suitable for slow scan.



# THE 'E' CODE

Typical of American humour the following was culled from the October issue of A5 Amateur Television Magazine:-

- E-1       STANDBY, LET ME GO OUT AND SEE WHERE MY ANTENNA IS POINTING TODAY
- E-2       LOOSE CONNECTIONS, FLAKY SOLDERING, IMPROPER DESIGNS
- E-3       CAMERA WAS NOT TURNED ON - SORRY
- E-4       NOT RECEIVING YOUR PICTURES 'COS MY TRANSMITTER WAS ON
- E-5       POOR LIGHTING CONDITIONS
- E-6       DARN VIDEO TAPE RECORDER IS NOT WORKING RIGHT
- E-7       NOT ENOUGH POWER SUPPLY VOLTAGE, WILL WORK ON IT THIS WINTER
- E-8       AMPLIFIER IS GETTING TOO HOT, WILL HAVE TO GET A FAN SOMETIME
- E-9       SORRY, HAD THE "STANDBY" SWITCH ON
- E-10      NOW ON A LOW-GAIN ANTENNA, HOW COPY?
- E-11      PICTURE IS ROLLING AND DON'T KNOW WHERE TV VERTICAL CONTROL IS
- E-12      WATER IN N-CONNECTORS
- E-13      HARDLINE CABLE IS SO EXPENSIVE AND TOO HARD TO GET
- E-14      LOTS OF LEAVES ON TREES HERE, WILL TRY AGAIN THIS FALL
- E-15      LOTS OF JUMPERS AND WRONG TYPES OF CONNECTORS IN ANTENNA LINE
- E-16      DON'T KNOW MY OUTPUT POWER, CAN'T AFFORD A WATTMETER
- E-17      DON'T GET A5 MAGAZINE
- E-18      JUST HAVEN'T BEEN ON LATELY, HAS THE BAND BEEN OPEN?
- E-19      DIDN'T CATCH BAND OPENING, SLEPT LATE
- E-20      BAND MUST NOT BE IN GOOD SHAPE TODAY

"E" means EXCUSE code.

How many of these excuses do you come on the air with?



# Gamma and automatic gain control

Dr.C.J.D.Catto.

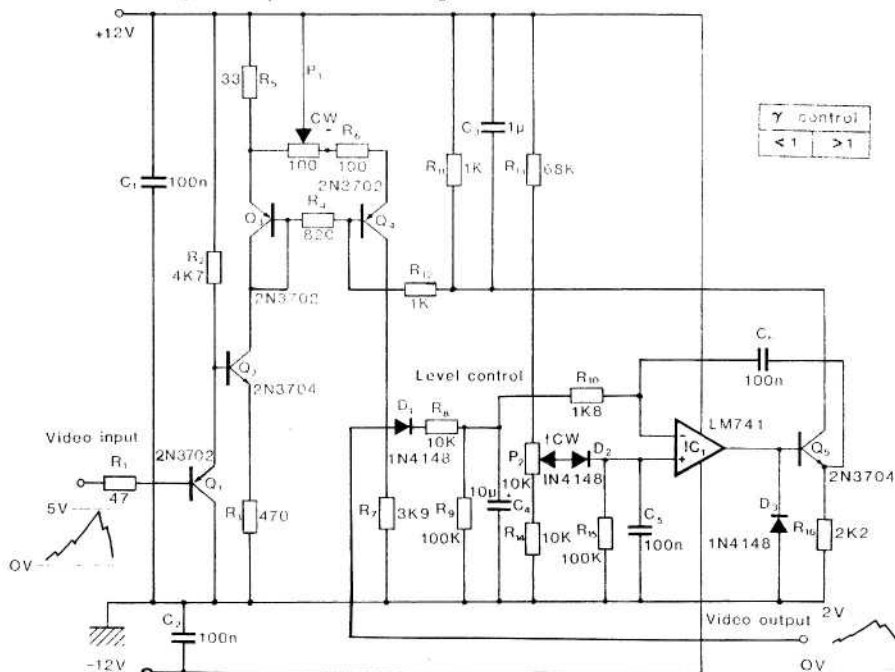
From Electronic Product Design Sep. 1982

In dealing with video signals, it is often convenient to have some form of automatic gain control, as well as a gamma control, where  $V_0 = KV_1$ . If  $K$  is made less than unity, the "whites" are crushed and the "blacks" lifted, and conversely for greater than unity.

The circuit shown provides a combined gamma and gain control. Video input voltage is transformed to current by the complimentary pair Q1 and Q2; then its logarithm is taken by Q3, whose partner Q4 takes the exponent and returns a voltage output at R7.

Any offset injected via R12 to the base of Q4 causes a relative shift in the log-exponent actions and hence effects a multiplication, giving gain control. Any imbalance in the emitter resistance causes signal-dependent shifts, and effectively gives a gamma law; P1 controls this, with R5 and R6 for matching the characteristics. (Q3 is run harder to increase speed). The video voltage is peak-detected by D1 and C4, and compared with the desired level set by P2 (and compensating diode D2) at the op-amp, which drives current source Q5. This provides feedback via R11 and R12 to the base of Q4, to correct the gain.

The video pass-band extends to about 500KHz, adequate for the 256-line frame running at 10Hz that was employed. For TV applications, faster transistors should be used, and impedances and signal levels reduced.



With thanks to the Editor for his kind permission to re-produce this article.



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Grant Dixon, "Kyrles Cross", Peterstow, Ross-on-Wye, Herefs. HR9 6LD.

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SLOW-SCAN TV EQUIPMENT. "WB9LVI F/S S/F converter (built by G3MHG) W/LMD SSTV keyboard, via G3WW (built by G3GGJ). The pair for £100 plus carriage. Reason:- Sale, XYL had stroke, no time for use. H.Burton G2JR, QTHR, Coventry. Tel: 0203 455021.

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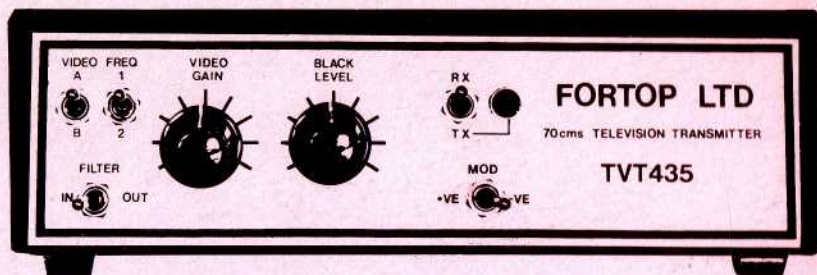
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